

# **Sunshine in Ikisaya**

*Exploring a research-introduced social enterprise and its potential to provide basic electricity services and to reduce vulnerability in a Kenyan village.*

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## Abstract

The Solar Transitions project initiated and implemented Ikisaya Energy Centre, a social enterprise providing solar powered electricity services in Ikisaya village in Kenya. This study explores to what extent participatory development can create a financially, organizationally, and socially sustainable social enterprise on the village level, and how this social enterprise can reduce the vulnerability of poor people through providing accessible basic electricity services. Findings suggest that participatory development approaches play an important role in ensuring project relevance and broad ownership within communities. However, the trade-offs involved in participatory development such as the balance between time constraints and local involvement, or between flexibility of investment thresholds and the demand for local initiative, may severely threaten project sustainability. Active measures must be taken to ensure local leadership and avoid donor dependency. Running a social enterprise requires a range of personal qualities such as engagement and accountability towards the constituency at hand. Transferring the leadership of a social enterprise therefore requires identifying special individuals within the community, which in this case proved challenging.

Ikisaya Energy Centre provides basic electricity services for subsidized prices. Provision of electricity significantly improved the ability of a substantial part of the population to increase their income. It increased opportunities for homework hours, boosted village activity, and created a new sense of identity in Ikisaya. Ikisaya Energy Centre may enhance empowerment, social capital, self-esteem, and contribute to vulnerability reduction across groups in Ikisaya. However, despite subsidized prices, the poorest within the community were largely not able to access the services on a regular basis, which questions the ability of a social enterprise to reach the very poorest.

**Key words:** social entrepreneurship, social enterprise, contextual vulnerability, participatory development, climate change, development, Kenya, rural electrification, off-grid, solar power.



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# Abbreviations

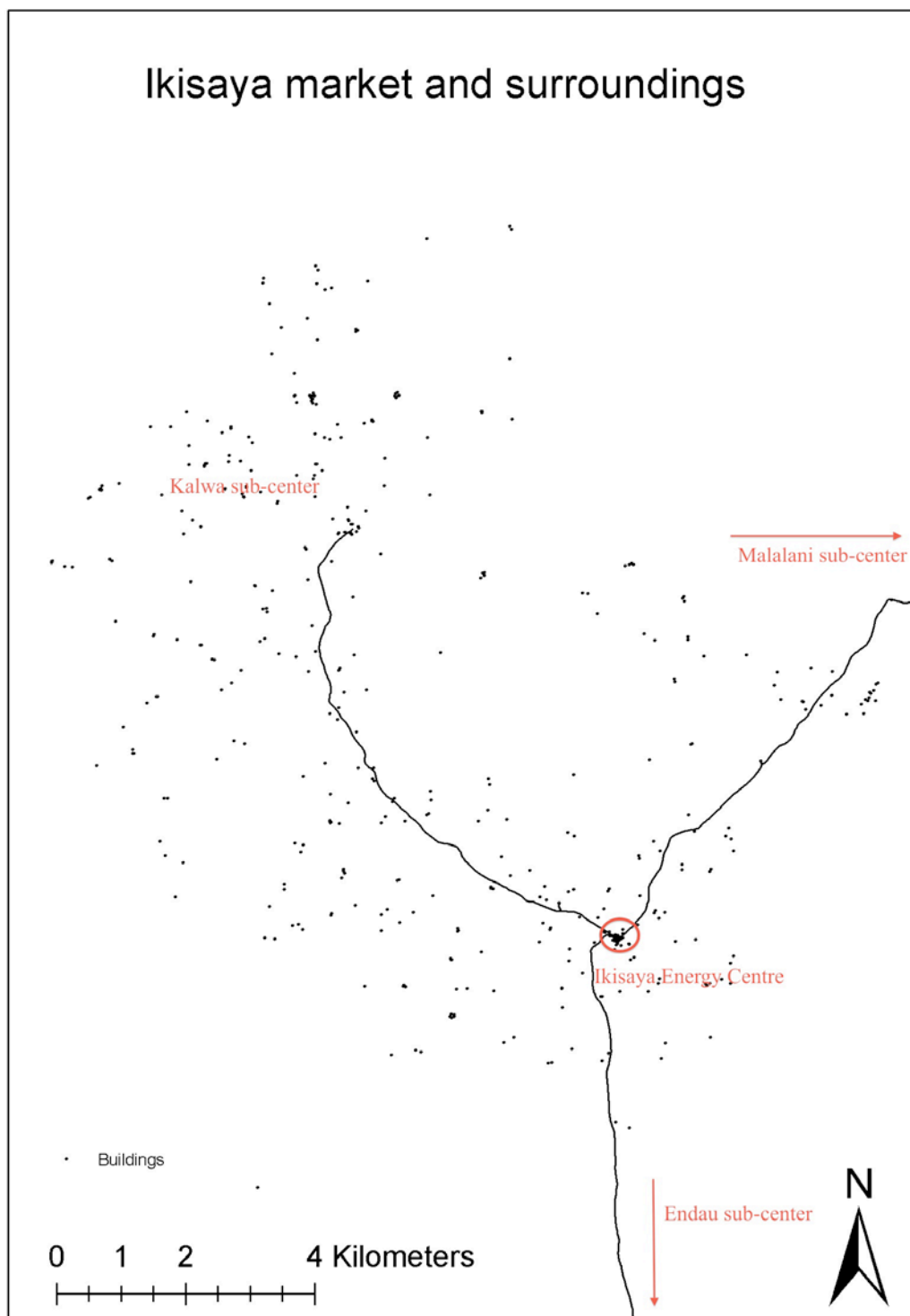
<b>CBO</b>	Community-based organization
<b>GDP</b>	Gross domestic product
<b>IEC</b>	Ikisaya Energy Centre
<b>IEG</b>	Ikisaya Energy Group
<b>IPCC</b>	Intergovernmental Panel on Climate Change
<b>KES</b>	Kenyan shilling
<b>NGO</b>	Non-governmental organization
<b>NOK</b>	Norwegian krone
<b>PD</b>	Participatory development
<b>PPP</b>	Purchasing power parity
<b>PRA</b>	Participatory rural appraisal
<b>PV</b>	Photovoltaic
<b>SMEs</b>	Small and micro enterprises
<b>SSA</b>	Sub-Saharan Africa
<b>ST</b>	Solar Transitions
<b>USD</b>	US dollar

# Maps



*Map 1: The location of Ikisaya village in Kenya (Google Earth 7.1.2.2041 2013).*





*Map 3: Settlements in Ikisaya. Local research assistants used a GPS to mark the exact location of all households in Ikisaya. The map shows where the settlements are located. Ikisaya Energy Centre (circle) and the locations of the sub-centers are added by author (Solar Transitions Project 2011d).*





# 1. Introduction

This thesis explores a specific research-introduced social enterprise, its potential to provide accessible basic electricity services, and to reduce vulnerability in Ikisaya, a poor rural village in the Kenyan drylands. The pilot project: Ikisaya Energy Centre (IEC) was initiated and implemented by the action research project: Solar Transitions (ST), led by the University of Oslo. IEC is an off-grid solar powered charging station offering rental of electric lanterns, charging of mobile phones, TV shows and news, and printing, copying, and typing services. After the research project's initial investment in 2012, the Energy Centre was supposed to operate in a financially sustainable manner through charging customers subsidized prices for services. Lessons from the IEC pilot are used for implementing similar models in other Kenyan villages. The data presented in this study was mainly obtained in Ikisaya in October 2012, seven months after the Energy Centre opened. In the following, I will introduce my research question and key concepts, before I provide the rationale for my choice of topic and case study. Thereafter, I provide the thesis structure.

## 1.1 Research question

This thesis seeks to answer the following research question and sub-questions:

### **Research question**

To what extent has Solar Transitions managed to create a financially, organizationally, and socially sustainable model for basic rural electricity supply, and to what extent do the services provided by Ikisaya Energy Centre reduce vulnerability across groups within Ikisaya village?

I will define what I refer to as financial, organizational, and social sustainability in chapter 6.

### **Sub-questions**

1. In what ways have local power relations influenced the design, implementation, and operation of the IEC, and to what extent has ST challenged or reinforced existing local power relations in Ikisaya?
2. What is the relationship between ST and IEC? To what extent do people in Ikisaya show leadership in the operation of IEC, and what are the challenges of participatory methods for realizing the transfer of a social enterprise?
3. To what extent has the IEC, through the selected business model, managed to combine financial sustainability with access to solar powered electricity services for all, including the poorest in Ikisaya?
4. To what extent has ST contributed to reducing contextual vulnerability in terms of creating opportunities for livelihood diversification and enhancing empowerment and social capital across groups in Ikisaya?

### **1.2 On the need for rapid adaptation: Addressing vulnerability through participation and social entrepreneurship**

Since pre-industrial times, the global average temperature rose by 0.85°C (IPCC 2013: 2). Temperatures are projected to continue to rise further within this century (IPCC 2013). As human suffering and the consequences for the Earth's ecosystems and biodiversity will be severe, even with a relatively low rise in global mean temperature, the Intergovernmental Panel on Climate Change (IPCC) stresses that adaptation to climate change will be necessary both in a short and a long-term perspective (IPCC 2007b). For poor people in developing countries, climate change is just one of several potential stressors caused by poverty, demographic change, social and economic development processes, and technological change (O'Brien et al. 2009). With climate change these processes might lead to increased or reduced risk (Patwardhan et al. 2009). The failure to find effective ways to enable people to meet the consequences of climate change

can reverse development and push poor people into deeper poverty, further exacerbating their vulnerability to external stress. It is therefore crucial to identify efficient ways in which vulnerable and poor populations can adapt to climate change in the near future (Eriksen et al. 2011).

I see vulnerability as contextual, and define contextual vulnerability as a dynamic process where combinations of biophysical and social factors determine individuals, or groups, potential for harm to multiple stressors—various forms of change—including climate change (O'Brien et al. 2007). Vulnerability reduction can be seen as an adaptive response to climate change. Responses to reduce vulnerability include: technological interventions directly targeted at the physical risks of climate change, interventions targeted at the underlying social causes of vulnerability, and empowerment through education, access to financial resources, livelihood diversification, or access to information (Adger et al. 2009).

The need for adaptation to climate change in developing countries has been on the international agenda since the Earth Summit in Rio de Janeiro in 1992. The most vulnerable countries, identified as the Least Developed Countries, Small Island Developing States, and Africa, have received special attention (UN 1992). Despite recent developments within climate change adaptation in the United Nations Framework Convention on Climate Change (UNFCCC 2011; UNFCCC 2012; UNFCCC 2013c), the international community has yet to agree on how they intend to secure long-term finance (see also UNFCCC 2013a; UNFCCC 2013b).

It is widely recognized that institutions and governance lie at the core of the implementation of adaptation. Whereas the international focus has predominantly been on international and national institutions, adaptation will, in practice, happen at the local level (Agrawal and Perrin 2009). Developing countries are seen to be more vulnerable to climate change particularly due to their weak institutional capacities (Adger 2006). Thus, successful implementation of

adaptation measures will be especially challenging in these countries.

Participatory approaches are often used when implementing adaptation and development projects on the ground. Participatory development became popular within the development agenda in the 1990s. At the core was a thought that beneficiaries should be included in and thus empowered to drive their own development. Local participation would ensure project relevance and through transferring project ownership to beneficiaries, projects would be more cost efficient and sustainable (Cooke and Kothari 2001).

There is little academic research on the link between social entrepreneurship and vulnerability. Here, social entrepreneurship is viewed as a private initiative, with a primary purpose of finding and implementing innovative responses to social problems. Typically, within this approach, is the view that small changes produced in the short term, can create ideas, capacities, resources, and social arrangements that can lead to sustainable social transformations (Alvord et al. 2004). Social entrepreneurship has emerged as a legitimate model to provide solutions for vast global issues like climate change and poverty, and to facilitate transformative social change (Skoll 2009). Social entrepreneurship happens outside the governmental sphere. It can appear as a promising tool for climate change adaptation because initiatives can avoid the limitations caused by bad governance and corruption. Moreover, social enterprises often aim to be financially sustainable and may not be dependent on continuous external funding (Ridley-Duff and Bull 2011a). They might therefore represent a low-cost alternative to climate change adaptation. Emergence of social enterprises can in themselves, or through the services they provide, lead to income generating activities, diversifying people's sources of income, and thereby contribute to reducing their vulnerability to stress. While the idea of social entrepreneurship is relatively new, many initiatives have attempted to use entrepreneurial approaches to solve social problems before (Alvord et al. 2004). For example, the links between microfinance and adaptation, as well as innovation and adaptation, have

been recognized (Heltberg et al. 2009; Agrawala and Carraro 2010; Osbahr et al. 2010; Rodima-Taylor et al. 2012; Rodima-Taylor 2012; Scheffran et al. 2012; Olwig 2012).

The combined focus on social entrepreneurship and vulnerability suits the examination of the case in question. As my case used participatory development approaches to implement the project in the local context, I also draw on this literature. I use literature on vulnerability, and climate change adaptation, to understand the situation people in places like Ikisaya face in relation to a range of stressors, and how their situation can be alleviated. Literature on participatory development describes the complexity of introducing projects and transferring ownership to local communities. Literature on social entrepreneurship is necessary to understand hybrid organizations' balance between financial sustainability and social value creation, in addition to the special kind of leadership and engagement involved in implementing and running such projects. To combine these three bodies of literature might not be common, but I found all three necessary to fully assess my research question. In the theory chapter, I indicate how some of the insights deriving from the three bodies of literature may generally be combined.

### 1.3 Choice of case study

Findings in this study are based on a qualitative study. I chose a case-study approach to explore my research questions in depth. Ikisaya, a small rural village in Eastern Province in Kenya, is the location of my case study. I explore to what extent IEC can be considered a viable model for providing people with access to electricity services in poor, rural, communities. I also explore how the provision of basic electricity services enables inhabitants to reduce their vulnerability to climate variability and change, as well as to other stressors. I chose this particular case study for several reasons:

Firstly, IPCC identifies Africa as one of the most vulnerable continents to climate variability and change. Africa is seen as especially vulnerable due to its economic reliance on climate sensitive sectors. Furthermore, comes Africa's weak adaptive capacity related to endemic poverty, governance challenges, weak institutions, limited access to markets and technology, degradation of ecosystems, and conflicts (Boko et al. 2007: 435). In Africa, 60.4 percent (2011) of the population live in rural areas (UN-DESA 2012: 11). Some of the most vulnerable populations are people in sub-Saharan Africa (SSA), who largely or fully depend on rain-fed agriculture or pastoralism (Cooper et al. 2008). Climate change is likely to cause a significant decrease in crop production in suitable rain-fed land (Boko et al. 2007; Cooper et al. 2008). Already drought prone areas are projected to become more marginal (Boko et al. 2007).

Climate change is likely to have a severe impact on livelihoods in the drylands of East Africa as climatic uncertainty, in terms of floods, storms, and shifts in seasonality, probably increases (Owour et al. 2011). This is also true for Kenya, where droughts and floods pose serious threats to the socio-economic development of the country. Observed climatic trends include a general warming over land areas and a reduction in cold extremes over arid and semi-arid land. Annual rainfall trends are either neutral or slightly decreasing (Government of Kenya 2012). Agriculture contributes directly to 24 percent of the Kenyan gross domestic product (GDP) in addition to 27 percent of indirect contribution, and 65 percent of informal employment in rural areas. Agriculture is mainly rain-fed, making the economy vulnerable to climate related stress. (Government of Kenya 2012: 4). Kenya's National Climate Change Action Plan estimates that the cost of extreme climatic events may amount to 2.6 percent of the annual GDP (Government of Kenya 2012: 5). Almost 30 percent of the population live in areas classified as arid and semi-arid (Government of Kenya 2012: 3). In sum, people in rural Kenya, as well as SSA in general, are highly dependent on climate sensitive sectors, such as rain-fed agriculture, for securing their

livelihoods. These people are among the world's most vulnerable populations to climate change. Therefore, it is important to understand how rural communities in SSA can best prepare for climate related, as well as other, stressors. Ikisaya is a poor and remote village in a drought prone area. The population depends mainly on rain-fed agriculture and pastoralism. The village resembles many rural places in the region, and is therefore a suitable case study for assessing measures to reduce vulnerability.

Secondly, I wanted to look at social entrepreneurship in relationship to vulnerability reduction, because social entrepreneurship has arrived as a promising discourse to solve social issues. Social enterprises can broadly be defined as: "socially driven organizations with social and/or environmental objectives combined with a strategy for economic sustainability" (Ridley-Duff and Bull 2011a: 61). IEC can be seen as a social enterprise because it aims to provide accessible electricity services to a poor community in a financially sustainable manner. IEC is thus a good entry point to explore social entrepreneurship and vulnerability reduction in SSA. Thirdly, as previous research on vulnerability was conducted in the village (Eriksen et al. 2005; Owour et al. 2005; Eriksen and Lind 2009; Owour et al. 2011), I had a good contextual background for my research. Fourthly, the ST team had documented preparatory research activities, business records, and model design. This made it possible to explore the sustainability of the model and enabled triangulation of findings. Moreover, the project was led by the University of Oslo, which eased my access to informants and contacts. Fifthly, the ST project aims to develop a transferrable model for solar powered rural electricity supply. The prospect of contributing to this work was an important motivating factor for me.

My fieldwork in Ikisaya lasted from 7 October to 10 November 2012. Interviews with members of the ST team were conducted between 11 June and 16 October 2013. My data collection includes 61 interviews with various stakeholders, field

observations, collection of business statistics, and an extensive document analysis. The vast amount of primary and secondary sources enabled me to triangulate findings, and thus add trustworthiness to my conclusions.

## 1.4 Thesis structure

The remaining part of this thesis is organized as follows: Chapter 2 presents a brief contextual background to Kenya, including development indicators and access to electricity. Chapter 3 provides the theoretical framework for this study. It presents literature on vulnerability, participatory development, and social entrepreneurship, before providing a model for analysis. Chapter 4 presents the methods used for collecting data and discusses ethical considerations and the limitations of this study. Chapter 5 presents Ikisaya village, the Solar Transitions project, and gives a detailed description of the Ikisaya Energy Centre model. Chapter 6 presents the first part of the study's findings. The chapter discusses to what extent the research project ST has created a sustainable model for rural electricity supply through the establishment and operation of IEC. Chapter 7 presents the second part of the study's findings. It discusses the potential of IEC's social value creation in the form of vulnerability reduction in Ikisaya, and presents findings related to income diversification and education, as well as non-material benefits for the population. The chapter also discusses accessibility of the services for the poorest and for distant settlements in Ikisaya, and thus the potential of the IEC model to provide basic electricity services to all. Chapter 8 provides a conclusion.



## 2. Kenya: Electricity and development

Kenya is a low income developing country in Eastern Africa (The World Bank 2013a). The total land area is 580,728km<sup>2</sup> and 85 percent is classified as arid and semi-arid land (Government of Kenya 2012: 3). In 2012, the national population is 42 million people, of which 76 percent live in rural areas. The population is poor. In 2005, 17 percent live for less than USD1.25 (PPP<sup>1</sup>) a day<sup>2</sup> (The World Bank 2013b). Kenya has a score of 3 out of 6 on CPIA transparency, accountability, and corruption index.<sup>3</sup> Kenyan respondents of Transparency International's global corruption barometer (2013) show little faith in governmental institutions. A high occurrence of bribery, indicate substantial governance issues in implementing adaptation and development projects on the ground in Kenya (The World Bank 2013b; Transparency International 2013). This chapter briefly presents the electrification situation in Kenya and how access to electricity in rural areas relates to development.

### 2.1 Access to electricity in rural areas

In 2009, 1.3 billion people lack access to modern electricity in the world. The majority of these live in rural areas in developing countries. Sub-Saharan Africa (SSA) has an electrification rate of 41.8 percent and 585 million people lack access to electricity. While urban areas have an electrification rate of 68.8 percent, the electrification rate in rural areas is only 25 percent (International Energy Agency 2013). In 2008, only 15 percent of the population in Kenya have

<sup>1</sup> Purchasing power parity is the relative purchasing power for the same goods and services in different countries. It is a tool to compare standards of living across countries (Banik 2006: 13).

<sup>2</sup> 32 percent lives below USD2 (PPP) and 16 percent lives below the national poverty line of ~USD18 per person per month (The World Bank 2013b; Kenya Open Data 2013). Currency exchange rate 01.11.12: KES1=USD0.0115. For simplicity, I use this exchange rate as default if nothing else is indicated (Oanda 2013).

<sup>3</sup> Country Policy and Institutional Assessment is an annual exercise for countries within the World Bank's International Development Association (The World Bank 2013b).

access to electricity, while the urban rural divide is respectively 51.3 and 5 percent (Abdullah and Markandya 2012: 103). Most rural households depend on traditional fuels such as firewood, charcoal, farm residues, and kerosene, for cooking and lighting, exposing the population to severe health consequences and limiting economic development.

The lack of electricity supply in Kenya is a combination of failed governance, lack of financial capital, an inability to pay for connection costs, and low consumption among rural households (Abdullah and Markandya 2012). To enhance rural electrification in Kenya, the program “Electricity Together” was launched in 2006/2007. “Electricity together” attempted to find cost efficient solutions for rural electrification. Rural electrification was further emphasized by Kenya’s recent development blueprint “Vision 2030”, where one goal is to provide all Kenyans with electricity by 2030 (Abdullah and Markandya 2012; KETRACO 2013). Kenya has pursued an integrated approach to rural development, providing electricity in addition to infrastructure such as roads, telecommunications, health, and educational facilities (Kirubi et al. 2009).

Most rural electrification schemes have largely been unaffordable for the poor (Cook 2011). Despite Kenya’s bold visions, the cost of connecting to the grid is likely to be too high for most rural households. Thus, although the grid might come near a rural community, most households will not have the ability to pay the connection fee. Investing in household solar photovoltaic (PV) panels is also unaffordable for most rural households (Abdullah and Markandya 2012).

Therefore, there is a need for small-scale solutions and alternative electricity-provision models to provide all Kenyans with electricity. Cost-efficient alternatives where local communities collaborate with non-governmental organizations (NGOs), the private sector, or financial institutions, and in which operation costs are partly covered by customers, are suggested by academia as

alternative solutions for electricity provision in Kenya (Kirubi et al. 2009; Cook 2011; Abdullah and Markandya 2012). Ikisaya Energy Centre is such a project.

### **2.1.1 Electrification and development**

While the access to electricity may not in itself lead to rural development, it is an essential component (Kirubi et al. 2009). Introduction of electric lanterns have been shown to reduce fuel costs, change lighting practices, expand business opportunities and opening hours, and increase the number of small enterprises (Cook 2011). Kirubi et al. (2009) found that small and micro sized enterprises (SMEs) play a major role in linking rural electrification with rural development. SMEs accounted for around 30 percent of GDP and 90 percent of job creation outside agriculture in 2003, making it an important factor in the Kenyan economy (Government of Kenya 2004a in Kirubi et al. 2009: 1210). Thus, rural electrification can lead to increased employment and livelihood diversification. Other beneficial effects include rising quality of education through prolonged hours for homework and enhanced educational achievement. Moreover, access to TV improves access to information and can help spread knowledge about health and family planning (Cook 2011).

### **2.1.2 Off-grid and solar electrification**

Major national initiatives to enhance rural electrification through grid extensions have faced difficulties in SSA. The scattered settlements in the region cause electricity loss and demand vast investment, maintenance, and administration costs. Moreover, people in rural areas are poor and have a limited ability to pay for services (Kirubi et al. 2009). Some countries, like South Africa and Zimbabwe, have improved electrification levels significantly in the past 20 years, partly through a focus on off-grid alternatives focusing on lighting for poor communities (Cook 2011).

Solar powered electricity provision emerged in the development agenda in the 1970s. The idea of a small-scale technology, that could be distributed on a

household and business level, was compatible with the move towards a neoliberal market-based approach to service provision (Jacobson 2007). Kenya is one of the leading developing countries within the renewable energy and solar power realm. In 2000, 4.2 percent of rural households owned a solar system, while 4.3 percent were connected to the national grid (Jacobson 2007: 146). Thus, solar power can represent a key alternative to rural grid connection. Solar power demand, in the form of solar home systems, has largely been driven on an unsubsidized market basis in Kenya (Jacobson 2007). Jacobson found that 80 percent of the solar PV home system users consist of shop owners (who might also farm), rural professionals, such as teachers and civil servants, pastors, and some smallholder cash crop farmers (Jacobson 2007: 151). While the outreach goes beyond the rural elite, the rural poor are largely excluded from the solar market in Kenya. Solar home systems only play a modest role in income generating activities among users in rural areas. In Jacobson's study, only 48 percent of users reported that the electricity was used for income generating activities (Jacobson 2007: 152). Moreover, the limited power generation from small solar home systems was mainly prioritized for connective devices such as TV and phone charging. Homework and household chores were not prioritized. The electricity generated by solar home systems in rural Kenya is thus mainly used for supporting interconnectivity between urban and rural areas and between rural areas and the world (Jacobson 2007). TV viewing and mobile phone use can result in health benefits such as increased knowledge about family planning, HIV/AIDS and Malaria. Mobile phones can also be used for maintaining networks, or for business purposes (Jacobson 2007; Kirubi et al. 2009). However, as the rural poor are largely excluded, an unsubsidized approach to solar electrification might not be a sufficient tool for reaching the poorest.

Kirubi et al. explores the socio-economic impact and financial sustainability of a community driven micro-grid project in Lamu Province in Kenya. The diesel-driven micro-grid project was externally funded, but driven by the community

from 1994–2007. They found that access to electricity increased productivity and revenues for SMEs, through increasing productivity per worker by 100-200 percent and revenues by 20-125 percent (Kirubi et al. 2009: 1218). Electricity also improved the delivery of social and business services including schools, financial institutions, and agricultural tools. Thus, access to electricity contributed to achieving higher social and economic development in the community (Kirubi et al. 2009).

Cost recovery is the most important factor in securing long-term effectiveness for rural electrification projects (Barnes and Foley 2004). In Kirubi et al.'s case study, the community-based organization did not manage to fully ensure financial sustainability, including operation and maintenance costs of the diesel powered micro-grid. However, it was five times better than the national utility in ensuring cost recovery (Kirubi et al. 2009: 1217). Thus, Kirubi et al. argues that common property resource management models for basic rural electricity supply might be a viable alternative to grid extension, given that communities manage to balance various interests and manage potential conflicts (Kirubi et al. 2009).

This chapter has introduced the electrification situation in Kenya and how access to electricity can lead to development for rural communities. The following chapter will provide a theoretical frame for this study.



### 3. Theoretical approach

In providing the theoretical approach of this study, this chapter starts by briefly presenting literature on vulnerability. It further presents participatory development approaches and the concept of social entrepreneurship. Lastly, it provides a framework for analysis in this study.

#### 3.1 Vulnerability

Ikisaya is a poor, remote, and deprived village in Eastern Kenya. The livelihoods of the population in Ikisaya are mainly dependent on small-scale farming and livestock keeping. The social, political, and ecological conditions in the area make the population highly vulnerable to climate change and other stressors. This section will introduce theories on vulnerability.

Vulnerability is revealed when people are exposed to climatic stress or shocks, for example, a drought or a storm. It is altered according to the reoccurrence and magnitude of these stressors (Cannon 1994; Cutter 1996). Vulnerability can be explained as “being susceptible to injury, damage, or harm” (Smit and Pilifosofa 2001: 894) and is commonly understood as a function of biophysical and social factors (O’Brien et al. 2004; Adger 2006; Engle 2011). It is an essential concept in the literature on adaptation to climate change. IPCC defines vulnerability as:

...the degree to which a system is susceptible to, and unable to cope with, adverse effects of climate change, including climate variability and extremes. *Vulnerability* is a function of the character, magnitude, and rate of climate change and variation to which a system is exposed, the sensitivity and adaptive capacity of that system (IPCC 2007a: 6).

As we can see, IPCC explains *vulnerability* to climate change through three concepts: *exposure*, *sensitivity*, and *adaptive capacity*. *Exposure* can refer to the extent to which a system is physically subjected to harm, *sensitivity* can refer to the extent a system is affected by it, while *adaptive capacity* describes the ability

of a system to cope with, prepare for, or adjust to stressors (Engle 2011: 649). Coping strategies include reactive, short-term actions to deal with shocks, problems, and opportunities, while adaptation responses can be viewed as planned actions to manage long-term change (Osborne et al. 2010).

### **3.1.1 Multiple stressors: climate change and development challenges**

Reducing vulnerability to climate change is closely connected with development challenges and vice versa. Climate change vulnerability can be reduced by adapting to the impacts of climate change, and by improving livelihoods, living conditions, and access to resources for those vulnerable to climate change.

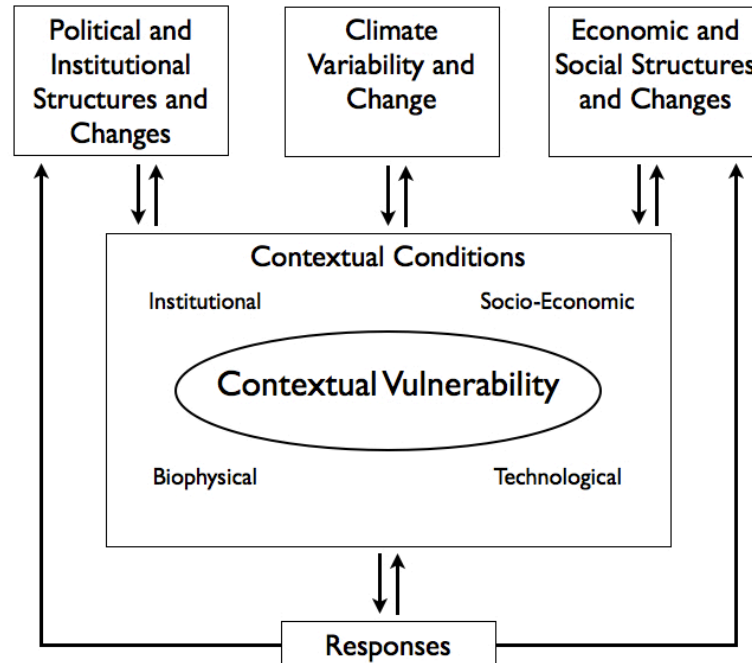
Further, development projects must take the consequences of climate change into account in project planning and execution to avoid maladaptation (Klein et al. 2007). People who are vulnerable to climate change are often vulnerable because of, and according to, several stressors such as development challenges, economic globalization, social and cultural factors, and conflicts (Ford 2009; O'Brien et al. 2009). Changing the conditions for one stressor can change people's overall capacity to adapt. Moreover, as the drivers of vulnerability are generated by the wider context, vulnerability to climate change cannot be isolated from vulnerability to other stressors. Potential measures to address vulnerability are often linked to issues related to poverty and development (O'Brien et al. 2009).

The framework of contextual vulnerability (O'Brien et al. 2007) connects vulnerability to climate change with broader development challenges.

Vulnerability is seen as a starting point and thus considered as existing inabilities to cope with external pressure and change. Vulnerability is shaped by social and ecological systems, which in turn are generated by multiple factors and processes (figure 1). The framework holds that climate variability and change happens within a context of "political, institutional, economic, and social structures and changes" (O'Brien et al. 2007: 76). These contextual conditions interact dynamically with exposure, which might be related to climatic variability or



change or other processes. Thus, contextual vulnerability conceptualizes vulnerability not only to climate change, but to various forms of change (O'Brien et al. 2007).



*Figure 1: Contextual vulnerability (remade from O'Brien et al. 2007: 75)*

Because climate change alters biophysical conditions, which influence a society's capacity to cope with other global processes, and vice versa, climate change and development issues are tightly knit and must be considered in relation to each other. Viewing vulnerability in a contextual framework enables us to understand the broader conditions in which climate change affects people differently across and within societies. In depth understanding of a location can help identify how multiple stressors interact with the driving causes of vulnerability; and thus how socio-economic conditions constrain or enable coping and adaptation of individuals, groups, or societies. By targeting the drivers of vulnerability and introducing social measures to overcome these, we can increase people's capacity to respond to various stresses, including present and future climatic variability and change (O'Brien et al. 2007).

### **3.1.2 Reducing vulnerability**

Adaptive capacity is shaped by factors such as wealth, access to technology, education, information, stability, infrastructure, institutions, governance, and management capabilities (Smit and Pilifosofa 2001; Engle 2011). It is not equally distributed between or within societies (Adger et al. 2007). Exposure to, for example, a drought, will affect people in the same community differently. Already marginalized groups will be disproportionately affected by climate change both in developed and in developing countries. Moreover, as vulnerable people and places are often excluded from decision-making and access to power and resources, adaptive measures tend to benefit the relatively advantaged (Adger 2006). It is therefore important to analyze and recognize potential values and conflicts of interest within the individual societies and how these might influence the outcome of adaptation measures. Linking adaptation with empowerment and democratization can represent measures to include marginalized groups and avoid conflict (Eriksen et al. 2011).

#### *Social capital and innovation*

Important elements in adaptive capacity are communities' ability to act collectively and hence their level of social capital and trust (Adger 2003). Social capital, in the form of multiplying ties of reciprocity, expanding social networks beyond family and kinship, and the ability to socially organize, may expand peoples success in diversifying income sources and create opportunities for innovation (Olsson et al. 2004 in Osbahr et al. 2010; Rodima-Taylor 2012; Scheffran et al. 2012). Rodima-Taylor et al. argue that social action and innovation can build local resilience and facilitate climate adaptation (Rodima-Taylor et al. 2012). The concept of adaptation is defined as: "the adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities" (IPCC 2007a: 6). Innovation can be defined as "the act or process of introducing new ideas, devices, or methods" (Merriam-Webster 2013), and can thus be seen as a

way to exploit beneficial opportunities and might therefore lead to climate adaptation.

Through four case studies in South Africa, Osbahr et al. (2010) found that important factors in enduring adaptation initiatives include the role of agency in the form of local entrepreneurs, innovators, and social learning. Structured forms of sharing and transfer of knowledge between community members, and from key individuals within the broader community, enabled further innovation and self-organization. New leaders, as local entrepreneurs and innovators with external networks, education, or a history of migration, were seen as role models and often took on important roles for creating these forums for knowledge sharing (Osbahr et al. 2010). Thus, social capital (see section 3.2) can foster innovation and adaptation in local communities. However, Olwig found that the creation of formalized groups by external agents could create a sense of dependency. In her case studies in Ghana, emphasis on groups, and the intervention by external development agents, did foster innovation and resilience among the communities. On the other hand, it also limited individuals and groups ability to fully take the lead in their own development because they continuously sought to balance between being resourceful and needy enough for the development practitioners (Olwig 2012).

### **3.1.3 Summary: vulnerability reduction and access to electricity**

Understanding vulnerability to climate change in a context of multiple stressors is crucial to understand the processes that drive vulnerability and to design effective adaptive measures that include the needs of the most vulnerable. Addressing the drivers of vulnerability, which are often related to development and poverty, can reduce vulnerability. Emphasizing empowerment and democratic structures can better ensure the voice and interests of poor and vulnerable populations. Moreover, social capital and trust within communities can foster innovation and cooperation and thus be important in reducing

vulnerability and adapting to climate change. As we saw in chapter 2, provision of electricity can enhance opportunities for livelihood diversification through off-farm and entrepreneurial activities, provide health benefits, and enhance opportunities for education through prolonged hours for homework (Jacobson 2007; Kirubi et al. 2009; Cook 2011). Thus, bringing basic electricity services can contribute to vulnerability reduction. Today, many efforts to reduce vulnerability, including the Solar Transitions project, use participatory methods to ensure project relevance, and longevity, and to foster social change.<sup>4</sup> In the next section, I present literature on participatory development.

## 3.2 Participatory approaches to development

Solar Transitions (ST) used participatory approaches to implement Ikisaya Energy Centre (IEC) in Ikisaya, and in the process of transferring ownership and leadership of IEC to the community. To enable a discussion on the social, organizational, and financial sustainability of IEC, this section will present literature on participatory development (PD), including the newer history of PD<sup>5</sup>, an introduction of the rationale and key concepts, and theoretical developments.

### 3.2.1 The reoccurrence of participation in development

Participatory development (PD) approaches became popular in the 1990s as part of the alternative development discourse. Alternative development was a reaction against the top-down approaches dominating the development agenda for decades. The approach focused on basic needs, redistribution, self-reliance, and the participation of the beneficiaries in the planning and execution of the initiatives (Potter et al. 2004).

<sup>4</sup> Community-based adaptation is a concept within the adaptation literature (Reid et al. 2009). I will not go further into the literature on community-based adaptation here.

<sup>5</sup> Participatory approaches have a long history within the development discourse (for an historical overview, see: Hickey and Mohan 2004; Tschakert and Dietrich 2010).

PD promised a more democratic production of knowledge involving the local population in the creation and implementation of development projects. Hence, development was now going to be driven from below by the beneficiaries themselves and by NGOs working closely with the beneficiaries in the field. The argument was that by placing the beneficiaries at the center of development, development projects would; (1) empower the beneficiaries and enable them to facilitate their own development; (2) make projects more relevant as beneficiaries took part in developing them; and (3) increase project sustainability and reduce costs through the transfer of ownership of projects to beneficiaries (Cooke and Kothari 2001). At first, PD was mainly developed and exercised by NGOs and development practitioners. Later, the use of participatory methods became increasingly important within the academic disciplines of politics, sociology, anthropology, and economics (ÖZerdem and Bowd 2010).

### **3.2.2 Participatory methods**

One of the first and foremost advocates for participatory research methods was Robert Chambers (Cooke and Kothari 2001: 5). Chambers advocated for participatory rural appraisal (PRA)—a methodology for gathering information in the field. The motivation for PRA was ideological and disadvantaged people are viewed as both materially and socially excluded. Through the active participation of socially excluded individuals and communities, PRA methods sought to empower beneficiaries to drive their own development and become more self-reliant. PRA advocates wanted the subjects, rather than the development practitioners, to be the center for knowledge generation. Principles of PRA include active learning in the field, triangulation of information, flexibility in goals and methods, focusing on building on the strengths of the community, and data analysis in the field (Bar-On and Prinsen 1999).

Participatory research uses a wide range of methods in the field, including: semi-structured interviews, key informants, group interviews and activities, hiring

local population as research assistants, and participatory planning, budgeting, implementing and monitoring (Chambers 1994). The data gathering, analysis, and planning processes of PRA should mobilize and gather information about the community on their terms, and enable community members and practitioners to understand and approach problems from a community perspective (Bar-On and Prinsen 1999).

### **3.2.3 Empowerment and social capital**

The theorizing of participatory development approaches is often divided into means and ends, separating the argument for increased efficiency on the one hand, and the social project of empowerment, equity, and social change for marginalized groups on the other. The participation of beneficiaries in projects in the form of labor, sitting in a running committee, or paying subsidized fees for services are seen as both efficient and empowering because they create ownership and at the same time maintain the project (Cleaver 1999). Moreover, through the establishment and strengthening of local institutions, participation facilitates Putnam's "face to face meetings" and can thereby contribute to creation of networks, which in turn can increase social capital (Putnam 1993; 1995; and 2000 in Wollebæk and Selle 2002).

Both empowerment and social capital became central in the development agenda parallel to the move towards participatory development (Potter et al. 2004).

Empowerment is often defined as processes where people are enabled to be the agents of their own development (Thomas 2000: 35). The focus on empowerment is in line with the capability approach of Amartya Sen. Sen views freedom as the means and end to development. Freedom is not only shaped by access to wealth, but by a range of interrelating social, political, and economic factors shaping peoples' capability of leading "the kind of life they have reason to value" (Sen 1999: 10). Sen believes that people are active agents and that they, through adequate social opportunities, can define and work towards what they

see as the good life, or well-being. Therefore, Sen does not see poverty as merely income poverty, but rather as capability deprivation. Through enhancing people's capabilities—empowering them—they are enabled to achieve freedom (Sen 1999).

Social capital can be defined as “networks, norms, and trust – that enable participants to act together more effectively” (Putnam 1995: 664-665). The idea is that individuals or group's networks and civic associations represent important assets that can be called on in a crisis or used for material gain. Thus, individuals and groups with strong and diverse social ties and networks are more equipped to manage challenges such as vulnerability and poverty (Woolcock and Narayan 2000). Bonding and bridging are two concepts used to describe various levels of social networks and ties. While, *bonding* can refer to social ties and networks within the immediate environment, such as ones extended family, neighborhood, and clan, *bridging* can refer to social ties and networks across these networks, connecting bonding networks. *Bonding* enables poor people to cope with situations, while *bridging* can enable them to escape poverty and achieve a better life (Woolcock and Narayan 2000). Cooperation, trust, and reciprocity are important elements of social capital. Trust, leading to solidarity among community or group members, is crucial in social cooperation. Bonding (within groups) and bridging (between groups) strengthen social capital through strengthening reciprocity, solidarity, and building identity and inner strength. Praszkie and Nowak claim that social capital is crucial for the economic performance of a community as it enables individuals to handle stress and pursue opportunities (Praszkie and Nowak 2011).

### **3.2.4 Towards a deeper understanding of participation**

Within a few years, most of the development sector had adopted PD approaches (Chambers 1994; Bar-On and Prinsen 1999; ÖZerdem and Bowd 2010). This enthusiasm was because the vision of empowering poor people to drive their own

development met both the ideology of radical development workers and correlated with development agencies objective of reducing aid spending (Bar-On and Prinsen 1999).

A strong critique emerged in the late 1990s. Bill Cooke and Uma Kothari accused participatory approaches for not meeting the promise of empowerment and decentralization of power, and for being tyrannical—“for facilitating the illegitimate and unjust use of power.”(Cooke and Kothari 2001: 4). They problematized PD’s potential to ensure sustainability, relevance, and empowerment. Critics questioned the ability of participatory methods to capture the needs of the community, and argued that practitioners and local elites tend to shape projects. Firstly, practitioners may use participation as a means to justify a pre-planned outcome, or beneficiaries may adjust their expressed needs to what they think the practitioners want to hear. Secondly, practitioners often use large gatherings of people, including community leaders and authorities, and local elites quickly find ways to dominate processes. Local power relations, undermining the voices of the relatively marginalized, can thereby shape the knowledge produced. Rather than ensuring relevance and empowerment of the marginalized, participatory methods can thereby allocate power and resources to the already powerful (Hildyard et al. 2001; Mosse 2001). Cleaver found that participatory projects made little difference to the livelihoods of the most vulnerable, or on the scope for social change (Cleaver 2001). On the contrary, in Mosse’s case study, participatory processes rather produced dependency, as the local population became passive recipients, focusing on maximizing short-term benefits as salaries and subsidies. Thus, rather than driving their own development, beneficiaries became mere clients of it (Mosse 2001). In sum, existing power relations within communities as well as the power relations between project and beneficiaries—those who give and those who get—might be hard to bypass. The tyranny critique therefore holds that facilitating local



knowledge, empowerment, and social change in development projects can be challenging in practice.

Several authors, including Hickey and Mohan (2004), answers to the tyranny critique, and give new insights to understand how participation can lead to transformation (Hickey and Mohan 2004). While local elites may benefit more than poorer members of the community, they are also important in getting projects to the village. The poor may view local elites as valuable to them, as elites had knowledge and social relationships. These enable elites to play a valuable role on behalf of the community (Williams et al. 2003). The richer elite represent important sources of employment, loans, and mediation in conflicts for the marginalized. As the relationships with local elites can be more important than the development project, poor peoples' engagement with projects will depend on its estimated impact for other social contacts (Williams et al. 2003). Moreover, beneficiaries' self-esteem, values, and identities might influence the willingness of relatively marginalized populations within communities to participate (Gaventa 2004). Some participants might not feel "good enough" to engage in discussions where outside experts are present (Cornwall 2004). Therefore, it is crucial to build people's awareness of their right to express opinions (Gaventa 2004). On the other hand, poor people might have more subtle ways to subvert the strategies of the powerful, through, for example, pretending not to understand, keeping silent, or not participating (Scott 1986 in Cornwall 2004; Williams 2004).

Nustad questions the notion of a true bottom-up process of development. He argues that development, in any form, is built on the same premise; that people who are perceived as developed take on a task to contribute to the development for those who are perceived as less developed. As the outside facilitators often have a clear thought of the direction in which the process should be heading, participatory approaches are merely a redefinition of an old paradigm. Hence, he

argues that finding solutions to development issues depends on our ability to find new ways forward (Nustad 2007).

### **3.2.5 Summary: Participatory development and the way forward**

In the past decade, researchers have discussed the potential of participatory approaches. Critics have problematized the ability of participatory approaches to reach out to the poorest, produce local knowledge, to increase income and livelihoods, or to enable communities to drive their own development. Others have argued that participatory approaches can have beneficial outcomes and that poor populations can be included if measures are taken to target them. However, post-development thinkers, like Nustad, question the ability of the present development discourse to solve development issues, and argue for the need to find new ways forward. Social entrepreneurs lead innovative grassroots efforts to drive social change (Skoll 2009). Through aiming for full project sustainability, and even profit-generation, from solving social issues, social entrepreneurs take the notion of participatory development further. Businesses must meet demand to survive and social enterprises therefore need to be relevant for the local context. Moreover, through fostering leadership, rather than ownership of a specific project, social entrepreneurs may create a viable foundation for social change. In the following, I present literature on social entrepreneurship.

## **3.3 Social entrepreneurship**

Social entrepreneurship is an intriguing concept because it holds that the bright ideas of people and their strong commitment to a cause can create significant social improvements. It has emerged as a legitimate model for transformative social change (Skoll 2009), is connected to high expectations, and has gained increasing interest among politicians, social activists, the private sector, as well as within academia in the past decades (Praszkier and Nowak 2011; Ridley-Duff and Bull 2011b). The focus on economic value creation enables expansion of the original initiative, or the creation of new social initiatives. Thus social

entrepreneurship answers to funding constraints within development, as well as in adaptation. Moreover, through building social capital, social entrepreneurs can have a catalyzing effect within societies, and thus contribute to social change (Osberg 2009). Within the terminology about social entrepreneurship, *social entrepreneurship* refers to a process or behavior, *social entrepreneur* to the founder of the initiative, and *social enterprise* to the tangible outcome of social entrepreneurship (Mair and Martí 2006: 37). This sub-chapter briefly presents various understandings of social entrepreneurship. It elaborates on the defining characteristics of social entrepreneurs, and introduces the term social enterprise. Lastly, it discusses differences between commercial and social enterprises, and how social entrepreneurs may contribute to social change.

### **3.3.1 Social entrepreneurship**

Despite high interest in the field, there is no common agreement about how social entrepreneurship should be defined (Dees 2001; Alvord et al. 2004; Seelos and Mair 2005; Mair and Martí 2006; Weerawardena and Mort 2006; Martin and Osberg 2007; Zahra et al. 2009; Choi and Majumdar 2013). Some definitions of social entrepreneurship are broad, including many innovative activities serving social purposes, such as for-profit ventures, commercial social ventures, the non-profit sector, or a mix of for-profit and non-profit approaches. More narrow definitions see social entrepreneurship as applying business skills to advance a social cause in the non-profit sector. Central to all definitions is the primary focus on social, rather than financial output and an element of innovation (Austin et al. 2006). Here, I define social entrepreneurship as private initiatives with the primary purpose of finding and implementing innovative responses to social problems. Small changes produced in the short term can create ideas, capacities, resources, and social arrangements that can lead to sustainable social transformations (Alvord et al. 2004). In the next section, I look into the defining characteristics of social entrepreneurs.

### 3.3.2 Social entrepreneurs

In agreement with a range of scholars (Dees 2001; Martin and Osberg 2007; Zahra et al. 2009; Praszkie and Nowak 2011; Tidd and Bessant 2013), I see social entrepreneurs as a breed of entrepreneur, whose primary goal is to create social value, not profit. Thus, to understand the features of social entrepreneurs, we need to understand the term entrepreneur.

The word “entrepreneur” means someone who undertakes a significant project or activity (Dees 2001). Jean Baptiste Say sees entrepreneurs as people who create value by shifting economic resources to more productive fields (Dees 2001; Martin and Osberg 2007), while Joseph Schumpeter sees them as the change agents in the economy, driving the creative-destructive process of capitalism by, for example, exploiting an invention, producing something new, or reorganizing an industry (Schumpeter 1942a; Schumpeter 1942b). The Say-Schumpeter tradition sees entrepreneurs as catalysts and innovators behind economic progress. The difference between entrepreneurs and ordinary shop owners is that entrepreneurs innovate—they create something new. By changing the current ways and systems in use, entrepreneurs create more value. Following Drucker and Stevenson, innovation and change orientation, as well as the ability to recognize and seize opportunities, vision beyond current resources, and engaging others to take part in their vision, are important entrepreneurial qualities (Dees 2001). Most of all, as emphasized by Schumpeter, entrepreneurs are leaders:

...the true importance of the function of the entrepreneur consists, not in the mere *running*, but only in the *creation* of an enterprise...In that meaning, the function of the entrepreneur is a special case of the social phenomenon of *leadership* (Schumpeter 1928: 241).

For him, intellectual characteristics are of secondary importance to strong will and commitment. The entrepreneur takes bright ideas and *implements* them in the real world (Schumpeter 1928). The combination of being able to vision and to practically implement ideas demands a specific set of personal characteristics,

which can be described as a mix of: “...structure with passion, planning with vision, tools with the wisdom to use them, strategy with the energy to execute it and judgment with the propensity to take risks” (Tidd and Bessant 2013: 8).

While entrepreneurs are leaders in the economic sphere, social entrepreneurs are leaders in the social sphere. Dees provides one of the classical definitions of social entrepreneurship (Praszkier and Nowak 2011). In Dees’ view, social entrepreneurs hold a set of exceptional behaviors and can be seen as change agents in the social sector, who are:

(1) Adopting a mission to create and sustain social value (not just private value). (2) Recognizing and restlessly pursuing new opportunities to serve that mission. (3) Engaging in a process of continuous innovation, adaptation, and learning. (4) Acting boldly without being limited by resources currently at hand. (5) Exhibiting heightened accountability to the constituencies served and for the outcomes created (Dees 2001: 4).

Ashoka—a large network of social entrepreneurs—views social entrepreneurs as:

...Individuals with innovative solutions to society’s most pressing social problems. They are ambitious and persistent, tackling major social issues and offering new ideas for wide-scale change...social entrepreneurs find what is not working and solve the problem by changing the system, spreading the solution, and persuading entire societies to take new leaps (Ashoka Innovators 2013).

Social entrepreneurs are leaders and visionaries who focus on the practical implementation of their vision. They aim to create social change and mobilize others to take part in their mission. Social entrepreneurs thereby act as empowering forces. Social entrepreneurs hold a remarkable set of characteristics, including passion, commitment to a social cause, and a high sense of ethics and accountability towards the societies that they work in. Therefore Dees (2001) states that: “Social entrepreneurs are a special breed of leader” (Dees 2001: 5). The following section presents the features of social enterprises.

### 3.3.3 Social enterprises

Social and commercial enterprises are not dichotomous, but a continuum ranging from financially to socially focused ventures. As figure 2 shows, enterprises focusing predominantly on creating financial value can create social value and enterprises focusing on creating social value might create financial value. The differentiation lies in what factor is the driving motivation (Alter 2007). There is no consensus on how to define a social enterprise. The common point for various definitions of social enterprise is that they are: “socially driven organizations with social and/or environmental objectives combined with a strategy for economic sustainability” (Ridley-Duff and Bull 2011a: 61).

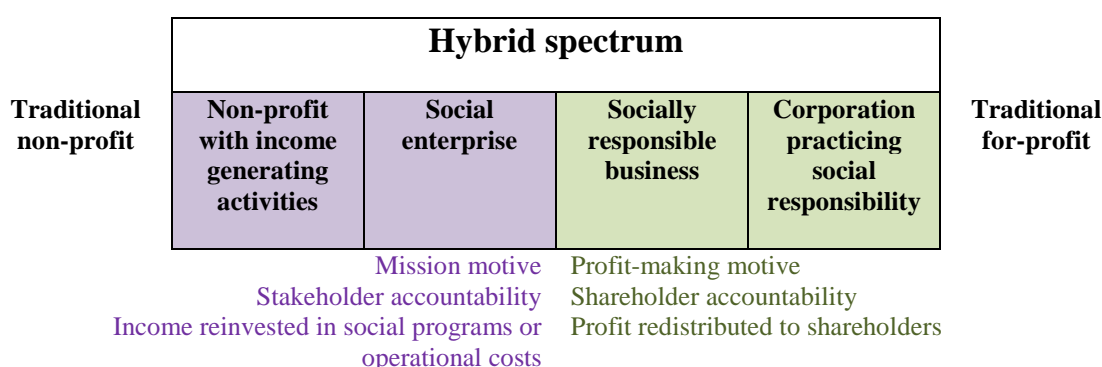


Figure 2: Hybrid spectrum for enterprises (remade from Alter 2007: 14)

Trade is the means to achieve the social purpose, which can be both external in terms of the tangible products or services the enterprise offers, or internal, which can be an aim to transform social relationships to achieve a more equitable distribution of power and wealth. Social enterprises are organizations that operate with a double or triple bottom line, practicing both altruism and commercial discipline or in other words seeking social/environmental and economic benefits—both social and economic value (Ridley-Duff and Bull 2011a). They can thus be seen as hybrid organizations. Practitioners of hybrid organizations differ from those who are purely philanthropic or purely commercial, as shown in table 1. In the following, I will look into the differences between commercial and social enterprises and the specific challenges social entrepreneurs face in the field.

*Table 1: Spectrum for practitioners (remade from Alter 2007: 13)*

	<b>Purely philanthropic</b>	<b>Hybrid</b>	<b>Purely commercial</b>
<b>Motives</b>	Appeal to goodwill	Mixed motives	Appeal to self-interest
<b>Methods</b>	Mission-driven	Balance of mission and market	Market-driven
<b>Goals</b>	Social value creation	Social and economic value creation	Economic value creation
<b>Destination of income/profit</b>	Directed towards mission activities of non-profit organization (directed by law or organizational policy)	Reinvested in mission activities or operational expenses, and/or retained for business growth and development (for-profits may distribute a portion)	Distributed to shareholders and owners.

### **3.3.4 Differences between social and commercial enterprises**

Social enterprises operate within the market sphere, while they aim for social output. Profit is only an enabling factor in the pursuit to fulfill the social mission (Dees 2001). As social entrepreneurs primarily seek to create social value, they see other opportunities and face different challenges than ordinary entrepreneurs. While commercial entrepreneurs mainly focus on creating new needs, social entrepreneurs address unmet basic needs. In poor communities where people are unable to pay the market price for a service, and governments do not meet social needs, the opportunity to create social value is high, while the opportunity to create financial value is low (Austin et al. 2006). While the test of successful commercial enterprises is the creation of viable and growing business organizations, the test of social enterprises is their ability to catalyze transformation in social systems. The original social enterprise might actually become smaller, while the spin-off effects it creates facilitate wide scale social change (Alvord et al. 2004).

Despite meeting a huge demand, the social value is not easily transferred into financial value as beneficiaries might not be able to pay (Dees 2001). Social entrepreneurs therefore face difficulties in measuring performance and thereby in maintaining stakeholder relations, as well as in competing with commercial entrepreneurs within the labor and the capital market (Austin et al. 2006). The

social mission is the primary focus of the social entrepreneur and the legal form of the venture depends on what form will serve the purpose best. Therefore, many argue that social enterprises do not need to contain a business model (Dees 2001; Austin et al. 2006; Mair and Martí 2006). However, as social entrepreneurs aim to create long term change and transformation, financial sustainability is at the core (Noruzi et al. 2010).

### **3.3.5 Social entrepreneurs build social capital**

Because social entrepreneurs aim to catalyze social transformation, building empowerment and social capital within their social environments are important for them. Social capital is created when the society adopts a new system, thus enabling the community to move forward without help of the original entrepreneur. However, societies with low levels of trust and cooperation will not necessarily build these assets due to a temporary disruption, such as a development project. The project may result in the beneficiaries becoming passive recipients expecting further external help, rather than being empowered. Thereby, a society's social capital may drift back to its previous state or even be weakened when the project ends (Praszkier and Nowak 2011). Further, social interaction might reduce social capital if collaborators cheat or take advantage, and thereby cause a break-down of trust and relations (Cope et al. 2007 in Ridley-Duff et al. 2011). Building empowerment and social capital within the communities they work enables social entrepreneurs to fulfill their mission. Moreover it enhances the capability of societies to drive their own development (Praszkier and Nowak 2011). These concepts are well established within development and vulnerability literature, which may in part explain why social entrepreneurship has become so intriguing within development spheres.

### **3.3.6 Critical reflections: another quick fix?**

A business approach to meeting basic needs, and a potentially catalyzing effect, seems like a good opportunity to meet the vast number of current world problems. Social entrepreneurship has therefore made an impression on



development workers, agencies, and governments. However, so far the measured success of social entrepreneurs has been on a relatively small scale (Sud et al. 2009). Although social entrepreneurship can represent a new paradigm of opportunities for solving social issues, social entrepreneurs face problems of securing start-up funding and support for up-scaling their initiatives (Farmer 2009). In both Europe and the US, government initiatives have been introduced to support social entrepreneurs (Skoll 2009; Ridley-Duff and Bull 2011a). Whereas social entrepreneurs can contribute significantly to their social environments, the role of the state or formal institutions in providing funding and measures to secure good environments for popular organizations, should not be ignored. Moreover, social entrepreneurs seek to provide business solutions to meet basic needs to the world's poor—people who are not full participants of the market. Basic needs, such as access to health care, nutrition, clean water, and electricity, are rights, and should not be treated as commodities (Farmer 2009). Social entrepreneurship can contribute to solve many problems, but may be inadequate to solve the vast array of social problems in the world today (Sud et al. 2009). Thus, the concept should be viewed as an interesting contribution to the development agenda and not as another quick fix for the world's poor.

### **3.3.7 Summary: Social entrepreneurship and development**

Social entrepreneurship rests on two principles: the ability to create social value, and the ability to create economic value. Social entrepreneurs are visionaries who mobilize others to take part in their vision, but most of all they are concerned about the practical implementation of their projects. They might catalyze social change through building social capital and empowerment. While social entrepreneurship can be an important contribution to the development agenda, the role of the state and formal institutions should not be neglected. In the next section, I will show the convergence points, as well as differences, between the three approaches, and present a framework for analysis in this study.

### 3.4 A framework for analysis in the present study

Theories on vulnerability, participatory development, and social entrepreneurship are all necessary to provide a framework for this study. The above shows that there are many convergence points between the three. For example: a focus on the poorest and most marginalized, empowerment and innovation, local knowledge, social capital, economic efficiency, and societal transformation. The three bodies of literature also add valuable lessons to each other's fields.

Vulnerability recognizes the importance of including the voices of the relatively marginalized and to utilize local knowledge when designing adaptive measures (Cannon 1994; Adger 2006; Eriksen et al. 2011). The vast academic literature on participatory development can add valuable experience in this field from earlier projects. Reversely, development literature must include knowledge on climate change vulnerability to avoid maladaptation (Klein et al. 2007). Vulnerability to climate change creates new social needs—markets for social entrepreneurs—and the literature on contextual vulnerability provides a background for social entrepreneurs to detect markets. Social entrepreneurs move the vision of participatory development further. By moving the focus from creating “ownership” to creating “leadership”, social entrepreneurship fully embraces the thought that poor individuals and communities can drive their own development. Moreover, a focus on social leadership rather than ownership can help us understand why it might be difficult to transfer participatory development projects to local communities. In addition, the focus on economic sustainability, rather than symbolic fees for services, takes the efficiency argument of participatory development to another level. However, if social entrepreneurship is to be a new discourse within development, lessons from literature on participatory development and vulnerability, will be vital.

In the present study, the literature on vulnerability gives insight to the complex social context faced by inhabitants of poor rural communities like Ikisaya. The literature on participatory development gives us a background for understanding

the pitfalls in engaging in participatory processes, and thus to understand the process of implementing IEC in Ikisaya. Social entrepreneurship literature is needed to understand the problems Ikisaya Energy Centre may face in the field, the crucial role of individuals, and the personal qualities required running a social enterprise. Figure 3 visualizes how this study draws on concepts and aspects within theories on social entrepreneurship, participatory development, and vulnerability. The boxes show how the various approaches of my theoretical approach can be seen within my case study. The arrows show what aspects of the approaches, in the various stages of my case study, bring to the establishment of IEC, and how IEC can potentially lead to vulnerability reduction and social change for people in Ikisaya. Moreover, the arrows show how the various actors and processes feed in to the goal of reducing vulnerability in Ikisaya and creating a transferrable model. The various factors interact and reinforce each other. For example, through the development of the IEC model, participatory approaches may lead to the empowerment of individuals and groups in Ikisaya. If the community takes leadership, they can facilitate their own development beyond ST and IEC. IEC originated as an act of social entrepreneurship by the project leader of ST. She will be referred to as “the initiator.” Her social mission is to reduce vulnerability in Ikisaya, and elsewhere, through the provision of basic electricity services. To fulfill this mission, she initiated and raised funds for the research project, and invested in equipment to build IEC—a social enterprise. Through participatory methods, the ST project adapted and implemented IEC in cooperation with the local community. If the project leads to the empowerment of the community, it may create leadership and a robust organization. This may lead to further empowerment of people in the community, to the sustainability of IEC, and thereby to long-term vulnerability reduction in Ikisaya. Lessons from the process, and the potential transfer of the model to other places, contribute to fulfill the original social mission of the initiator.

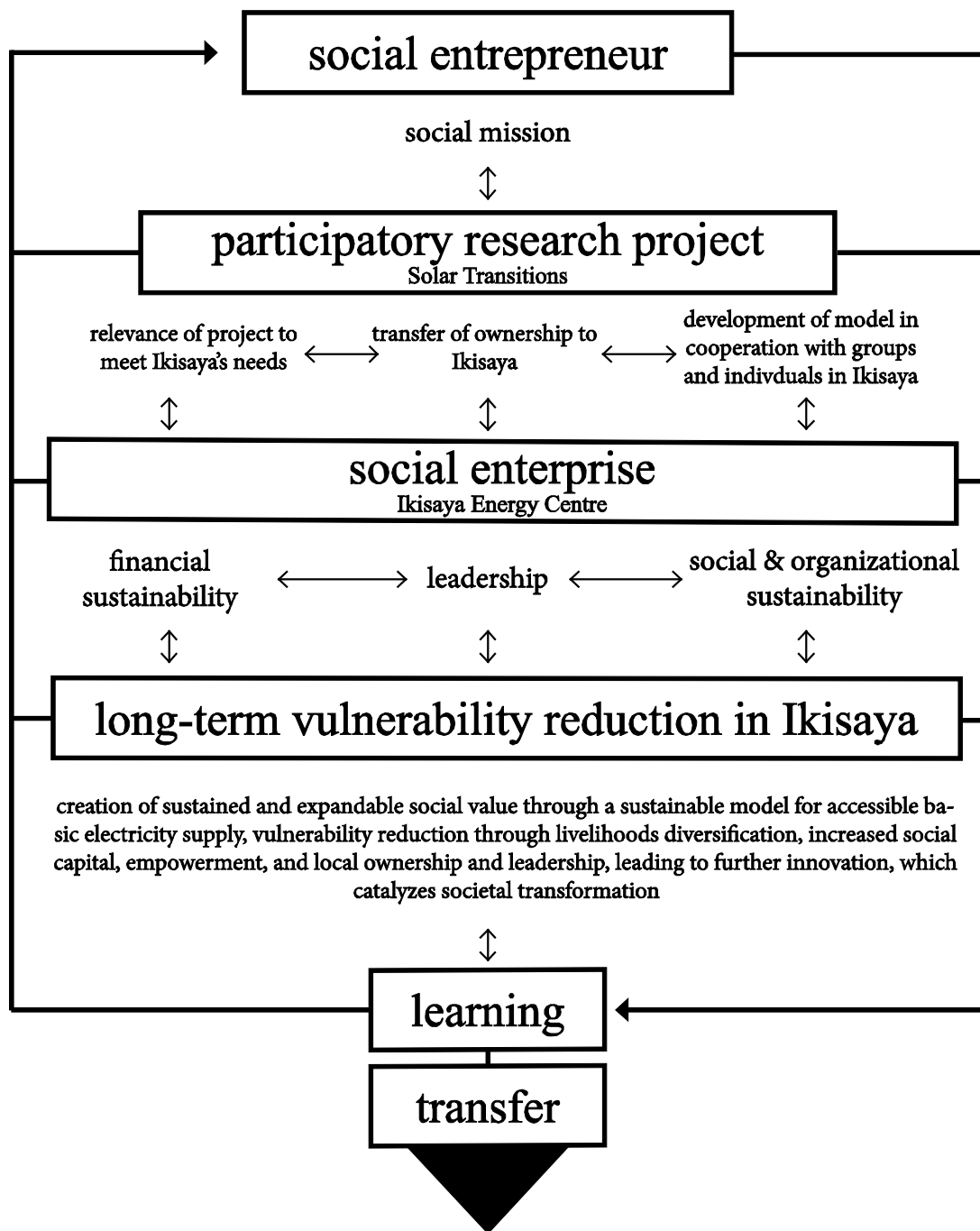


Figure 3: Analytical framework for the present study (source: author)

## 4. Methodological approach

In this chapter, I describe my methodological approach, the methods used, and the specifics of my data collection. I present my fieldwork in Ikisaya and the interviews conducted in Oslo, and provide some ethical reflections on my role as a researcher, as well as the limitations of this study.

### 4.1 The case study

Case studies are conducted when the researcher wants to explore a real world case and assumes that the contextual conditions are crucial in understanding it (Yin 2013). This study investigates a specific research-introduced social enterprise, Ikisaya Energy Centre (IEC), and its potential to provide accessible basic electricity services and to reduce vulnerability in Ikisaya village. The case study was a natural approach, as understanding interactions and relations between people within Ikisaya village, between this community and the Solar Transitions (ST) team, and peoples' use of electricity, were crucial for exploring my research question.

Research can be evaluated on the basis of trustworthiness, validity, and transferability. *Trustworthiness* is connected to the way in which the research is conducted. *Validity* is connected to the researcher's interpretation of results, which in turn provides a foundation for *transferability* of the findings to a broader context. To ensure *validity* of data acquired in an unknown environment, the researcher must try to understand the reality from the informant's perspective. Researchers conducting case-studies usually aim for the produced knowledge to be relevant for a broader context and case studies are thus designed to lay a foundation for *transferability* (Thagaard 1998). *Triangulation* is an important principle to ensure trustworthiness in case-study approaches. Any finding or conclusion is more likely to be accurate if it is based on several

different sources. Data triangulation can take two forms. The first is real triangulation where one finding is supported by multiple sources, while the second refers to using multiple sources in the same study that support different findings (Yin 2013). In this study, I have used both. Document analysis, interviews with various stakeholders, and observations, contribute to the conclusions. Some findings supporting the conclusion are not triangulated.

## 4.2 Data collection

Fieldwork in Ikisaya was conducted from 7 October to 10 November 2012. Data collection in Ikisaya includes field observation and semi-structured interviews with staff, board, and agents at IEC. Moreover, I interviewed members and non-members of the community-based organization (CBO) in Ikisaya to understand their thoughts and experiences with the ST project.

### *Practicalities in the field*

There are no hotels in Ikisaya and researchers have normally stayed with families. One of my supervisors, who had spent time in Ikisaya earlier, suggested a family I could stay with. I was introduced to the family by the local project coordinator and I asked if I could stay with them. They kindly welcomed me and housed me for my entire stay in Ikisaya. Staying within the fieldwork site enabled me to build strong relationships with people in Ikisaya and furthered my understanding of the social context. Family members of the family I stayed with had higher education and were fluent in English. This was convenient for me, as I speak neither Swahili, nor Kamba. My stay there gave me the chance to learn about the culture, norms, and everyday life in the community from my host family's perspective.

I employed one male and one female translator to conduct my interviews in Ikisaya. Both were familiar with the community and fluent in English and Kamba. Using local research assistants might be challenging regarding

confidentiality. Before hiring the translators and during the fieldwork, I explained and repeated the importance of keeping information obtained during interviews confidential. I think both translators understood and respected this. To have two different translators was valuable in several ways. The male translator had lived and worked in larger towns and had a good understanding of the questions in my interview guides. Working with him, I got accurate responses to questions. Moreover, when doing interviews with male informants, he might have helped counterbalance the fact that I was a young woman in a patriarchal society. Working with the female translator gave me more insights into the situation for women and girls in Ikisaya. As she lived in the village and worked as a teacher, she had a thorough understanding of the community, and my informants had confidence in her. Working with her, I experienced that informants opened up and spoke freely about difficult topics. In addition, altering between different translators was useful as their individual networks helped me identify informants from various groupings within the community.

Public transport is very limited and the scattered settlement pattern in Ikisaya demands traveling vast distances. To be able to travel around, I bought a motorbike prior to my arrival in Ikisaya. However, when I arrived, I realized that it was not safe for me to drive on the sandy dirt roads. This resulted in many of my interviews being conducted in Ikisaya market where IEC is situated. When conducting interviews far away from Ikisaya market, I had to use the male translator as he could drive the motorbike. Therefore, I could not always use a female translator when interviewing female informants. Using a male translator for some interviews with female informants might have prevented me from getting sensitive information regarding women's lives and situation in Ikisaya. However, I worked with the female translator whenever I planned to conduct sensitive interviews with female informants.

### *Translation, language, and data gathering*

Using translators can be a challenge as they might interpret rather than translate the information given by the informants (Leslie and Storey 2003). To my understanding, my translators were accurate and translated what the informants said most of the time. As I started to understand various words and expressions in Kamba/Swahili during the course of my fieldwork, I was sometimes able to detect and ask for direct translation when I sensed that the translators interpreted meanings. Moreover I employed one of the translators to transcribe the interviews he had participated in. I asked him specifically to transcribe what the informant said and not his translation. I used a digital recorder to record most of my interviews. This enabled me to pay attention to what informants said during interviews, to follow up with questions when informants touched on interesting topics, or to ask for clarifications. Moreover, it enabled me to use direct citations to illustrate my informants' views in the thesis. I chose not to use the recorder in interviews where I experienced that the informant was nervous.

#### **4.2.2 The interviews**

Interviews for this thesis were conducted in Ikisaya, Endau, and Malalani, in Oslo, and through Skype (see appendices for a full overview of interviews). In Ikisaya, I conducted 32 interviews with households and professionals at the IEC, in addition to four key informant interviews. Ten shop owners and lantern customers were interviewed in Malalani and Endau. I made sure to conduct interviews in settings where conversations could happen privately so that the informants felt free to say what they wanted. Interviews with the four ST team members were conducted in Oslo and through Skype between 11.06.2013 and 16.10.2013. I used semi-structured and open-ended interviews. All interviews were transcribed and analyzed with Nvivo. Essays were written by pupils themselves and thereafter typed into word by me. Table 2 gives an overview of the interviews conducted for this study.



Table 2: List of interviews conducted for this study

Informant group	Number of informants	Informant code
Professionals: IEC staff, board, and ST team	11	P
Households in Ikisaya	25	HH
Shop owners in Malalani and Endau	10	SH
Essays from standard 8 pupils	11	Essay
Key informants: formal interviews	4	Key informant
Number of informants	61	

### *Interviews with professionals*

The ST team, staff, board, and agents were keys to understanding the research project and the process of transferring IEC to the local population. I prepared individual questions related to these informants' understandings and reflections about the preparatory research process, the current state of IEC in Ikisaya, their role, and their vision for the project.

I chose to interview four of the ST team members with various areas of expertise, roles, and involvement in the project. I developed a few questions, which I asked all informants to understand their individual interests and thoughts about the project. The rest of the questions were developed to suit the informant's expertise. These interviews helped me gain a better understanding of the process in Ikisaya, the organization, and work of the ST team. Two extensive interviews were conducted with the project initiator. As she is in weekly contact with the staff at IEC, these interviews were also useful to get information about developments in Ikisaya. Information retrieved about Ikisaya from her is shaped by her interpretation and might be colored by her personal motives. Nevertheless, she appeared to openly share information, including incidences that are not necessarily in favor of the project. Moreover, as a researcher it is also in her interest to understand the project as objectively as possible.

For the interviews with IEC staff and board members, I developed a set of questions that would help me understand their perception of the preparatory

process, their understanding of the model, and to what extent they had taken leadership in the project.

### *Household interviews*

To understand how IEC relates to vulnerability reduction, I explored how households made use of the Energy Centre through interviews in Ikisaya, Malalani, and Endau. I was interested in people's participation and experiences with the ST project, their feeling of inclusion in the preparatory process and in the CBO, and their ownership towards IEC. I therefore sought to interview a heterogeneous group in Ikisaya. This included users, non-users, members, non-members, and crossed age groups, gender, and clans. Interviews were conducted in Ikisaya market, behind IEC, or in the shops or homes of informants.

### **Purposive sampling**

To explore differences in use and participation, I chose to use purposive sampling for identifying informants. Access to preparatory fieldwork documents (see appendices), interactions with the staff, and statistical data collection at IEC, helped me identify key issues in Ikisaya as well as frequent user groups and individuals early in the fieldwork. IEC staff informed me that shop owners, and those living nearer to IEC, were frequent users. Therefore, I wanted to explore how IEC had influenced income diversification for shop owners in various settlement clusters in Ikisaya. To see whether there were differences between shop owners in Ikisaya and shop owners in relatively richer places, I interviewed ten shop owners in Endau and Malalani, including the agent in Malalani. The agents in Malalani and Endau provided me with lists of their customers that I used to identify informants. This sample method is referred to as "snowball sample" (Overton and Diermen 2003). Informants in Malalani and Endau were not from Ikisaya. Hence, they had not been included in the preparatory process and were not members of the CBO. These interviews focused on how the lantern was used by customers, how it influenced their lives, and their perception about having light and lasted between 20 and 30 minutes.

In Ikisaya, I went systematically from shop to shop and interviewed all except three shop owners in Ikisaya market. To compare and contrast with other households, I further asked my research assistants to take me to households who depended on casual labor, on selling handicraft, and to female-headed households, as I thought these households would be relatively poorer than shop owners. Interviews touched on informants' income sources and life situation, their use of and thoughts about IEC, as well as their thoughts about, experience of, and inclusion in the project. Most interviews were conducted with translation, except in a few cases when informants spoke English. However, as there was often need for clarification, the translators stayed during the interview. Interviews usually lasted between 45 minutes and 1 hour, except in a few cases when informants were especially talkative.

### **Informant characteristics**

To get information about how various groups and genders perceived their situation, I purposely chose informants from different parts of the village, female and male, people within various age groups, and to interview families who seemed especially deprived (for example single mothers), as well as those who seemed to have a little more (for example shop owners). My sample includes informants from all settlement clusters, while there is an overweight of informants living in Ngovovoni (near to IEC). It contains 21 women and 7 men. Thus, my understanding of the village from a male perspective might be a little restricted. I conducted 28 interviews from 25 different households. In some cases, I interviewed several members of one household (informant references A and B). In addition to the two largest clans, I have several informants from the smaller clans. The household sample contains informants from between 21 and 82 years. My plan was to stay in the field for two months. Since, I left Ikisaya earlier for reasons I will explain in section 4.3, I did not get to conduct all the interviews I had planned to ensure geographical representation and gender balance.

Table 3: Household informants per settlement cluster in Ikisaya

Ngovovoni	Ngiluni	Kyanzou	Mwalikanzi	Ndovoini	Kalwa
16	2	4	1	2	3

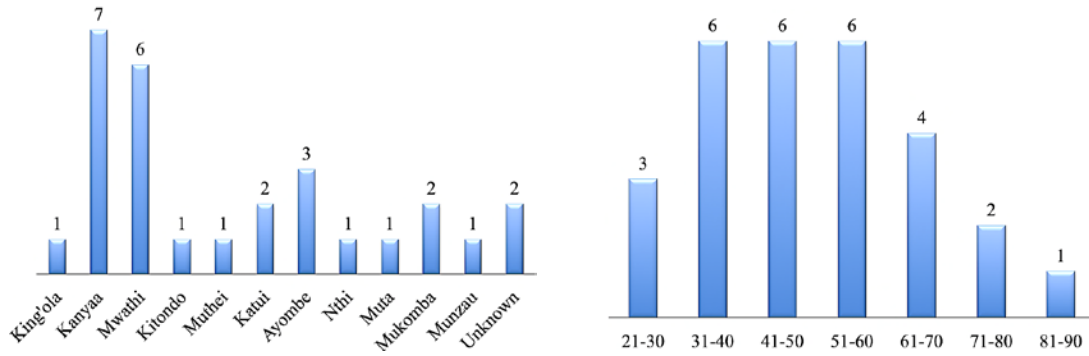


Figure 4: Clan (left) and age (right) representation in household sample

### *Essays from pupils at Ikisaya Primary School*

The focus of my informants throughout my fieldwork was the improved ability of children to study. Therefore, I wanted to explore how IEC affected children's study habits, as well as their thoughts about the IEC, and what they saw as important in their lives. In cooperation with the headmaster and the head teacher of standard 8 at Ikisaya Primary School, I asked pupils in standard 8 to write me an essay. They could choose between answering:

- 1) How was life in Ikisaya before Ikisaya Energy Centre opened and how is it now?, and
- 2) How do you see your life in 20 years?

I asked pupils to state their names and age at the beginning of the essay to get an overview of my respondents. To give something back to them, and to ensure that all had writing equipment, I bought a new writing book and a pencil for each pupil. I got the pages they wrote, while they kept the remaining equipment. The eleven pupils who responded were between 15 and 18 years and their responses reflected various interests and thoughts. Most pupils chose to answer the first question, while some answered both. In my interviews in general, I experienced that many informants found it difficult to imagine Ikisaya in the future. This was

also reflected in a key informant's statement when discussing his aspirations: "there are so many hardships in this place, we don't dream" (field notes).

Including the views of children and youth has often been neglected in academic research. However, a current trend among social researchers is to acknowledge children as actors with the ability to speak for themselves (Scheyvens et al. 2003b). Including participants below 18 years without parents' consent can seem unethical from a Norwegian perspective. I informed the pupils that their participation was voluntary and since the pupils got several days to write, parents had a chance to intervene. This might have resulted in not all of the children delivering an essay. From my interactions with this class, and from their responses, it seemed like the pupils happily shared their views with me.

#### **4.2.3 Field observations**

I lived in Ikisaya and interacted with people there for more than four weeks. Thus, I continuously participated in the society in various ways. Researchers can choose between several forms of observations in the field. Participant observation involves the researcher actively taking part in the situation, while passive observation involves the researcher observing without actively taking part (Thagaard 1998; Wilson 2010; Yin 2013). I found it comfortable and rewarding to actively participate in situations, while it was also important to remain passive or partially passive at times. I was careful not to make people feel uncomfortable and did not always say everything I thought. However, I felt that by participating, I gained trust within the community and that it improved my understanding of the culture, as well as interactions within the community. By actively engaging in activities with the staff at the beginning of my fieldwork, I got insights in their daily activities, including the interactions between the staff, and between staff, board, and customers. The ST team had a follow-up visit during my fieldwork and I had the chance to participate in meetings between the ST team and various stakeholders, and to watch interactions between the ST team

and the community closely. While most of the observation in the field was not planned, some was organized with the purpose of understanding either the society or specific topics more closely. For example, I conducted two home visits to households renting lanterns from IEC, to explore how and what they used the lantern for. I also visited (privately and publicly) arranged evening classes for homework. When visiting homes and evening classes, informants expected my visit. The situations I observed might therefore have been somewhat constructed, and it is difficult to evaluate how authentic these experiences were. The planned activities I observed are listed in the appendices.

Throughout my fieldwork, I kept a detailed field diary which I typed on my computer every evening or early morning. Moreover, I took notes during the day after experiencing interesting situations or conversations, or during meetings that I was invited to observe. Experiences and reflections in my field diary and notes have been valuable in remembering and understanding situations in the field. Right after fieldwork, I also wrote a short report with reflections on the fieldwork and preliminary findings.

#### **4.2.4 Statistics and document analysis**

##### *Collection of statistics and observation at IEC*

In the beginning of my fieldwork, I spent a week getting to know the staff, their views, and their role in the project. The staff helped me gather statistical data, including membership data, income and expenditures, and user statistics.

Membership statistics also, to some extent, enabled me to triangulate information retrieved in interviews regarding membership and use of IEC. However, it was not always possible to cross check, as people are known by several names and membership might be registered on other members of the household than my informant. A staff member, an elderly man who had worked as a research assistant with several researchers and was a “village elder,” also provided information on geographical location of members’ homesteads, income sources,

and gender. At that time, the staff had not developed routines for keeping membership statistics or analyzing income and expenditure through excel. It was time consuming and hard work for the staff to help me gather the data. In return, I gave them the lists and statistics I developed and showed them how they could use the documents later. Working with the staff and getting to know them enabled me to review the quality of the data I gathered at IEC, and financial reports I retrieved from the ST team after fieldwork, which I experienced as fairly accurate. I felt that these activities created a sense of trust between several of the IEC staff members and I. Towards the end of the fieldwork, staff members invited me to participate in staff meetings. In between interviews and activities with the staff, I was allowed to work in the IT clerk's office, where I could passively observe activities at IEC during the day and get an insight into the daily activities at the Centre.

As the presence of a researcher can be confusing to informants, they often try to place the researcher in a familiar role (Thagaard 1998). I was interested in the same topics as the ST team, and the staff knew that I was affiliated with the ST team. Therefore, I think it was natural for them to think of me as a member of the ST team, which was to my benefit as it was easy for me to gain trust and be included in the staff's activities. However, to avoid the staff relating to me as they related to the team, and to be able to remain in a more passive role, I kept on highlighting that I was a student and that I wanted to learn from them. Because I wanted to explore ownership and leadership within the community, and especially among staff and board members, I purposely remained passive a lot of the time and took care not to express my views on IEC before the end of my fieldwork.

### *Document analysis*

The use of document analysis was important for my thesis. ST aims to make replicable models for rural electricity supply and has therefore made an effort to

document the process through field reports and other documents. Access to project documents and field reports as well as interviews with the ST team made it possible to write this thesis. The project documents I have analyzed are listed in the appendices. I used the documents to understand how the ST team members experienced the process, how they developed the model, and to understand interactions between the ST team and community members. While I got some of the project documents prior to the fieldwork, all were analyzed systematically after the fieldwork. A documentary movie about the project gave me further insights into the community, and staff members' thoughts about the project at the time right before and after the opening of IEC. Since these sources were not made for the purpose of this study, I analyzed the sources within the context they were made (Thagaard 1998). At Kenya Meteorological Department, I retrieved rainfall and temperature statistics for Makindu meteorological station, which is the nearest meteorological station to Ikisaya. Although Makindu situates quite far from Ikisaya (around 100km), it is also in the Eastern Province, which is generally considered arid or semi-arid. I analyzed the statistics in excel.

### 4.3 To be a researcher in Ikisaya

When working in poor and marginalized societies, there are several precautions the researcher should take and prepare for. For my own sake, preparing for the hardships of fieldwork and exposure to extreme poverty, and culture shock, was an important aspect. More important, however, was to prepare for how my research activities might influence my informants, and to avoid causing harmful effects. Here, I will account for how I approached research ethics and dealt with difficulties during my fieldwork.

#### **4.3.1 Ethical considerations**

When studying contemporary phenomena in a real world context, researchers must ensure ethical practices and conduct research with care and sensitivity (Thagaard 1998). Good research ethics include the researcher presenting existing



literature, as well as research results, in an honest and accurate manner. The researcher must also consider how the research will affect informants and the society at large (Scheyvens et al. 2003a). In the field, ethics include securing the rights of the informant. This includes giving informants some control of their participation through informed consent, ensuring anonymity and confidentiality, to respect the privacy of the informants, and showing careful consideration of their integrity to ensure to “do no harm” (Yin 2013).

Research ethics also include the interpretation of data and how informants experience the interpretation of the researcher. The informants should not be put in danger of harm, physically or psychologically, because of the research. According to Kvale, ethical responsibility demands clear differentiation between the interpretation of the researcher and the experiences of the informant (Thagaard 1998). In this case, it was especially relevant in connection to informants from the ST team. My relationships with several of the ST members were characterized by multiple informal interactions, discussions, and sharing of experiences, which shaped my understanding of the case. Conflicting interpretations have since been discussed, and to avoid severe misunderstandings, the initiator has commented on a late draft of this thesis.

In doing research in a developing country context, it is important to acknowledge the power imbalance between a western researcher and informants in poor communities. As marginalized groups may already have low self-esteem, it is important that the researcher does not make the informant feel inferior during interaction (Scheyvens et al. 2003a). Moreover, it is important to be especially aware of the situation of the most marginalized informants within a community and ensure that the research process will not cause further difficulties in their lives (Yin 2013). During my fieldwork in Ikisaya, I did my best with trying to act in ways that would not harm my informants or cause harm in the community. In general, I think that most people I met knew that I was a student studying the

Energy Centre. When I started working with my research assistants, I carefully went through the text I wanted them to communicate to my potential informants, and explained that I did not want to force anyone to talk with me. When requesting people to take part in my research, I paid attention to the reactions of the informants. Although it is difficult to know whether the informants understand the full implications of being part of the research, all agreed to take part and I felt that they understood what I said.

I also explained and repeated the importance of confidentiality to my research assistants and they seemed to understand this. I never discussed sensitive information from interviews or interactions with contacts in Ikisaya, and interview transcripts, tapes, and field notes have been kept with me. In this thesis, I use informant numbers to ensure their anonymity. This is important for informants in Ikisaya, because of the sensitive information discussed in interviews. Except in cases where I discuss issues and incidents that are common knowledge in Ikisaya, I have ensured peoples full anonymity. It might be possible to recognize some of the informants from the ST team. However, I chose not to use their names because I wanted to limit the chance of my paper coming up if someone should make an Internet search on their names. Citations used from interviews with the ST team are approved through email.

In all interviews and interactions with informants, I did my best not to invade their privacy or make them feel uncomfortable. Because of the tense political situation in the community during my fieldwork, several sensitive issues were revealed during interviews. This made me include some questions in my interview guide related to decision-making power, and conflicts within the community. I feel that my questions related to these issues were open enough so that the informants could choose whether they wanted to discuss issues related to power relations. When informants seemed reluctant to touch on certain issues, I did not ask further questions. My experience, however, was that many informants

really wanted to talk about sensitive issues in the community concerning clans and elites, Many were happy to have someone related to the project to express their views to, and several people came to me and asked to be interviewed. I see this as an expression of trust. However, it also forced some considerations. While I did not want to turn anybody down, I was also scared that interviewing people who came to me would alter the validity of my findings. In this situation, I chose to only interview those whom I had already planned to approach and kindly explained to the others that I unfortunately did not have time that day.

I did not give any gifts to my informants when conducting interviews. Some of my contacts in Ikisaya thought that I at least could have provided people with a cup of tea when requesting their time. However, my fieldwork was at the end of the dry season and for many people that cup of tea might be the only meal they would get that day. As I did not want people to agree to be interviewed because they needed a meal and because it would be unfair towards those who did not “get” to be interviewed, I chose not to give anything.

### *Dealing with tensions*

From I arrived in Ikisaya on 8 October 2012 and until the ST team arrived for a follow-up visit on 29 October, there was a tension within the community. People thought that one family had too much influence in the project and tried to allocate all the resources, jobs, and contact with researchers to them. As I interacted with the community through conversations, observations, and interviews, I felt that this tension grew during my fieldwork.

I think that the local conflicts in Ikisaya escalated when I and another master student arrived in Ikisaya. We came at the end of the dry season, after three successively failed harvests. Many people had already sold most of their animals and had few resources left. Moreover, in Ikisaya, with few opportunities for paid work, western researchers represented a source of income and opportunity. I will elaborate on this in section 6.3.

We brought two new motorbikes and the opportunity of translation and chauffeur work to the village, in addition to possible revenue from housing us. Our gatekeepers and the people we were invited to stay with during our fieldwork belonged to the same family and the people we first hired for translation services were their relatives. This might have made some people in the community a little suspicious towards me at first and I felt that it restricted me from accessing the people's real opinions. To try to relieve the tension, I started using a new translator who was not connected to the family and employed my former research assistant as transcriber. Working with another research assistant, I experienced that my informants opened up and spoke more freely. As mentioned above, many wanted to talk to me about their concerns. Although researchers should be careful in triggering conflicts in the field, I let informants explain their views and concerns since I thought it would be important to understand the particular context in which I was gathering my data. Moreover, the information was important for my thesis.

### *Leaving the field*

The tensions in Ikisaya were quite stressful for me because it concerned the family I lived with. When the ST team came, tensions escalated as one of my host family's relatives was fired from IEC. When the ST team and the other master student left, I was stressed by the tension in the village, and scared that potential reactions in the community would be channeled towards me. After a few days alone, I decided that it was time to leave. I told people I had gotten sick (which was true) and needed to go home. A few more weeks would have given me further insights into the way people in Ikisaya would handle the situation after the ST team left, and what effect the intervention by the ST team had. Moreover, it would have given me time to get more interviews and a more diverse household sample. However, I had managed to get a lot of data already and I do not think that leaving the field earlier had very important implications for my results. While the experience in the field was challenging, the situation

also enabled me to understand aspects of the local conflicts and social life in Ikisaya which I might not have had gotten under different circumstances.

#### 4.4 Limitations

I have considered a number of research limitations and biases when analyzing my data, which are summarized below. Firstly, the findings of this study are mainly based on fieldwork conducted only seven months after IEC opened and can only be seen as early results. More research is needed to understand the potential of IEC as an organization and its impact on vulnerability reduction in Ikisaya. For many of my informants it was difficult to distinguish between the ST team and me as an independent researcher. This may have influenced the validity of my data, as people might have been cautious to raise complaints or state opinions that they thought could be offensive to the ST team, or because they were scared that it would influence their future access to the services. As it might be difficult for my informants to understand the process of conducting academic research, some informants might have thought that I could influence the way the Centre was operating immediately. Therefore, some informants may have expressed more irritation with the situation than was really the case. On the other hand, some informants may have felt that I had too strong bonds to my host family and therefore may not have felt comfortable speaking freely with me. Lastly, I was a young woman in a patriarchal society. That may have affected what people wanted to talk to me about. Since most of my informants were women, that I too am a woman may also have been to my benefit.

#### 4.5 Summary

In this chapter, I have presented the methodological approach and methods of my thesis. My study is mainly based on qualitative data collected during fieldwork in Ikisaya village in October 2012 and in Oslo in 2013. I chose a case study approach to get a thorough understanding of the specific context in Ikisaya.

Interviews were conducted with 11 various stakeholders connected to IEC and ST. I conducted 25 household interviews in Ikisaya and 10 interviews with shop owners in Malalani and Endau. This study draws on an extensive document analysis, mainly of internal ST project documents. Given the context of this case study, and its limitations, I hope that this study will contribute to broader understanding of vulnerability reduction, participatory development, and social entrepreneurship.

The following chapter presents Ikisaya village, the ST project, and a detailed description of the IEC model. Chapter 6 presents the first part of the study's findings and will answer the first part of my research question, concerning to what extent ST has created a sustainable model for rural electricity supply? Chapter 7 presents the second part of the study's findings and answers the second part of my research questions, concerning to what extent IEC reduces vulnerability across groups in Ikisaya?

## **5. Ikisaya, Solar Transitions, and Ikisaya Energy Centre**

This chapter introduces Ikisaya village, which is the site of my case study. I provide an overview of the Solar Transitions (ST) project and the process of choosing Ikisaya as a pilot village. Lastly, I give a detailed description of the Ikisaya Energy Centre (IEC) model as it evolved. I draw on other studies and supplement these with empirical data from my own fieldwork.

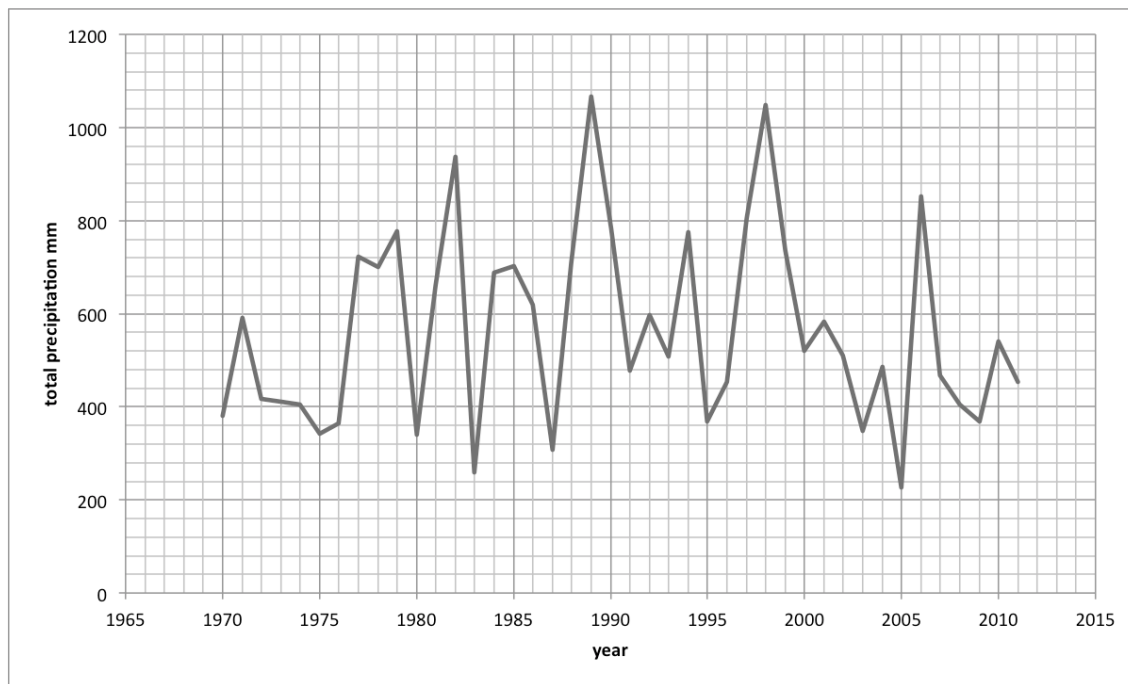
### **5.1 Ikisaya: a poor village in the drylands of eastern Kenya**

Ikisaya is also referred to as Syou sub-location, which is an administrative level in Kitui District (Kirubi 2011).<sup>6</sup> The village is situated some 400 km northeast of Nairobi. The total area of Ikisaya is 129 km<sup>2</sup> and the village consists of clusters of houses (Nzula 2011) (see map 2). The total population is estimated to be roughly 2000 (Kirubi 2011).

#### **5.1.1 Climatic conditions**

Kitui district is classified as semi-arid. Average annual rainfall ranges 500-1050 mm (Kirubi 2011). The rainy seasons often fail and the area is subjected to prolonged droughts (Eriksen and Lind 2009). People's livelihoods mainly depend on rain-fed farming and livestock keeping. Figure 5 shows that annual rainfall has been relatively low since 2007. When I was in Ikisaya, I was told that people there had experienced three consecutive droughts and many had sold off most of their livestock to obtain cash. Hence, people in Ikisaya are both exposed to climate variability and change, and sensitive to its effects.

<sup>6</sup> In Kenya, the administrative levels range from province, district, division, location, to sub-location. According to Kirubi, there has been an ongoing process of changes in the administrative levels for several years. I follow Kirubi who finds it most practical to refer to the old administrative names (Kirubi 2011).



*Figure 5: Annual precipitation at Makindu Meteorological Station (source: Kenya Meteorological Department).*

The framework of contextual vulnerability holds that political, institutional, economic, and social structures influence people's ability to cope with external pressure and change (O'Brien et al. 2007). This chapter will illustrate that people in Ikisaya can be considered highly vulnerable to stress, such as climate variability and change, because they are poor, live in an area which is prone to drought, depend on climate sensitive livelihoods, and lack access to basic infrastructure and decision-making power.

### **5.1.2 Livelihoods and poverty**

The majority of the population in Ikisaya lives off livestock keeping, and subsistence farming and sale. Many also keep beehives and mango trees, which can be a good source of extra income during the dry season. Various farm products and handicrafts are sold on a daily basis within the village (field observations). Opportunities for formal employment are confined to the elementary and secondary schools in the area, and the local administration (Eriksen and Lind 2009). In addition, some residents with higher education work



in neighboring towns. There are around 15 smaller shops in Ikisaya market, where some of the households supplement their income. The poorer families do casual labor for richer neighbors to obtain extra cash, gather rubble for construction work, and can sell off some of their allocated fresh water during the dry season. Other income generating activities involve illegal hunting and selling of game meat, prostitution, making charcoal, and brewing of the local beer. Many rely on remittances from relatives working in the urban centers. Migration, loans from neighbors, and governmental food relief programs are typical drought-coping mechanisms (Eriksen and Lind 2009).

In Kitui district, 63.7 percent of the population lives below the national poverty line (Kenya Open Data 2013). Owour et al. (2011) estimate that 58.1 percent of the population in Ikisaya lives below the national poverty line. While most people are poor, people with no other access to cash than farming, livestock, and casual work, are poorer than those with a small shop, paid work, or other income sources. The most vulnerable people in Ikisaya rely on work as casual labor, assistance from neighbors and social networks, and remittances from relatives during droughts (Owour et al. 2005). Social networks, especially extended family and clans, are important when managing crises. During crises, richer clan members usually help the poorer ones. Smaller clans are often poorer and have less access to land and assets than richer clans. Members of smaller clans are therefore generally more vulnerable than members of larger clans (Eriksen et al. 2005).

### **5.1.3 Organization and social life**

The assistant chief is the government representative of each sub-location (Eriksen and Lind 2009). The traditional governance structure in the village—the elders' council—is still operating, but has less power than before. A village elder leads each settlement cluster, and the six village elders in Ikisaya meet regularly to discuss matters in the community, and negotiate conflicts between individuals

in the village (Eriksen and Lind 2009; Winther 2011). While traditional institutions, like clans and elders, still play important roles in negotiating village conflicts, also newer political constellations, based on economic and political interests, emerged when negotiating with pastoralists. Interest groups consisting of, for example, well owners or traders, established alliances with governmental representatives to further their cause. Traditional institutions are still important for determining how people access resources and cope with conflicts and droughts (Eriksen and Lind 2009). However, clan affiliation can also be a source of conflict, which I elaborate below.

### *Clans*

By ethnicity, Ikisaya is homogenous and predominantly inhabited by Kamba, which is the main ethnic group in the district (Eriksen et al. 2005). The Kamba are organized in clans, which are informal institutions of social networks based on marital linkages. Individuals' access to networking, power, and control of natural resources are affected by the size of their clan. The various clans have individual ways of dealing with land regulations and for solving conflicts and disputes (Owour et al. 2005). Clan affiliation plays an important role determining social, economic, and political constellations in Ikisaya and the surrounding areas (Eriksen et al. 2005). There are two main clans in Ikisaya and the smaller and poorer clans usually takes sides with one of the two big clans (Winther 2011). The big clans often dominate development committees, which have been a cause of conflict, sabotage, and disruption of the water provision in Ikisaya. However, as issues related to clans are sensitive in Ikisaya, people can be reluctant to address them (Owour et al. 2005).

Today's pattern of land ownership, resource access, and socio-economic differentiation originates from when the first Kamba settlers immigrated to Ikisaya. People followed and settled nearby their clansmen. Therefore, different clans in and around Ikisaya dominate the various settlements. Based on their

findings, Eriksen et al. (2005) recommend that development and resource use committees should have representatives from each clan to avoid conflict.

### *Patriarchy and gender*

Ikisaya is a patriarchal society. Men are the traditional decision makers and sit in the council of elders. Elder women traditionally have some power through the *mwamba* group—a group of elderly women which is said to have spiritual powers (Owour et al. 2005). Married women belong to their husband's clan (Eriksen et al. 2005) and do not inherit from their fathers. They depend on their husband's clan for assistance. If a woman is widowed, she cannot remarry because it is looked upon as disrespectful to divorce a dead person. One informant explained:

According to our culture, if you have children and the husband dies, you have to stay there. You are not supposed to get married again. You know, at that time, people were paid for completely (bride wealth). When you have children, those children represent the name of that man. Even if he is dead, he is still my husband. It is very hard, but you can't go anywhere. You have to stay with the family of the husband (HH#17).

Eriksen et al. (2005) found that in some cases the husband's clan was less forthcoming with assistance to the widow than they had been to her deceased husband. Thereby, a widowed woman has less access to assistance from both her own family and her husband's family. As she is not allowed to remarry, the single mother has to take care of her household single-handed. Informants in Ikisaya often referred to the single mothers when I asked who the poorest people are. Female-headed households are particularly vulnerable because women have poor customary rights to land, wells, and livestock.

Some single mothers are said to take “boyfriends” (key informant), which is a form of prostitution. Poor women have sexual relationships with wealthier men in the village, who give them something to eat or help in return. Some women told me that the payment could be just a *chapatti* (bread), which is worth just 10

US Cents (KES10). According to several informants, these women often get many children and thereby an even harder situation to cope with (HH#6 and key informant).

Girl pregnancies are seen as a big problem in Ikisaya. It is quite common that girls get pregnant while still in primary school. If that happens, her parents are unlikely to pay for her further education because she is now seen as “wasted” (HH#6). As a man would not like to raise another man’s child, it will be difficult for her to get married. Based on fieldwork interviews and ST documents, I got the impression that rapes are quite common in Ikisaya. One informant told me that it is not seen as safe for girls and women to walk alone after dark (HH#6).

### *Religion and civil society*

The population in Ikisaya is predominantly Christian. Churches are meeting points and can contribute to strengthening networks within and between villages. For example, during the blessing of the holy water in the Catholic Church (observation 22.10.2012), people came from the neighboring parishes to celebrate with the parish in Ikisaya. An important meeting point in Ikisaya is the village market of each settlement and in Ikisaya market, where people sit down and talk. A woman told me that she and her husband always used to be by their shop in the afternoons and until late night to talk with people. Most people are members of self-help groups. Within these groups, households help each other with farm related work and they do various income generating activities. During my fieldwork, I got the impression that what side individuals take in disputes within the village can follow affiliation with self-help groups. People belonging to the same self-help groups often expressed very similar views about current village conflicts. Thus, these groups can be arenas for political and strategic positioning within the village.

#### **5.1.4 Basic services and infrastructure**

The Kenyan drylands have been systematically neglected in public resources distribution and service provision and people lack influence in decision-making (Eriksen and Lind 2009). There are a severe lack of basic services and infrastructure in Ikisaya, limiting economic development and coping opportunities during drought (Owour et al. 2005). There is not a health clinic, the dirt roads become impassable during the rainy season, people walk up to 10km for fresh water, and bad sanitation poses serious health implications for the population (Kirubi 2011). Ikisaya is not connected to the national grid. Before IEC opened in March 2012, only 6 percent of the population in Ikisaya had access to electricity through private solar panels (Kirubi 2011: 10). The vast majority used flashlights and kerosene lamps for lighting. In 2010, one fifth of the reported average monthly income was spent on energy services in total (ibid.). However, there were stark differences in energy use within the village; while the minimum expenditure was only ~USD0.6, the maximum expenditure was ~USD13.5 (ibid.). The national grid is planned to go through Ikisaya (P#8 and P#10). However, most households in Ikisaya will not be able to afford the connection (key informants and field observations).<sup>7</sup>

#### **5.1.5 Literacy and education**

Roughly 60 percent of women and 40 percent of men in Ikisaya were reported to be illiterate in 2010 (Kirubi 2011: 6), while the national average is only 13 percent illiteracy (2010) (The World Bank 2013b). Ikisaya has two primary schools, while the closest secondary schools are in Malalani and Endau (10-15km away). Primary education is free in Kenya since 2003 (Ministry of

<sup>7</sup> I have not managed to obtain a secure source for the exact cost of connecting to the grid. The connection cost has recently changed and may also differ according to when you choose to connect. The connection fee can cost between KES20,000 and KES36,000 per household. Households situated far from the transformer will have to buy their own transformer, which can cost up to KES200,000 (P#8 and P#10).

Education 2006).<sup>8</sup> However, in Ikisaya the parents still pay semester fees, as government funding is not sufficient (key informant). Many struggle to keep up with the school fees (Ulsrud 2010; Ulsrud and Winther 2011) and although most parents might say that their children are in school, the children usually have breaks when their parents are unable to pay the fees (key informant). This seems to be the norm in Ikisaya. While children should finish primary school when they are 13, the eleven children who wrote me essays in standard 8 at Ikisaya Primary School were all between 15 and 18 years old.

The grade of the national final exam determines what secondary school the pupil can be admitted to. Pupils from rural primary schools and poor urban areas have substantially less chance of getting admitted to higher ranking secondary schooling, limiting their chances of meeting university entry criteria (Oketch and Somerset 2010). In 2008, the Government of Kenya launched a free secondary schooling program. However, while the state covers most of the tuition fees, schools still charge an amount and parents have to pay for uniforms, boarding, and other items. Costs of secondary schooling therefore still far exceed what many rural households are able to pay (Ohba 2011).

### **5.1.6 Vulnerability in Ikisaya**

By applying the contextual vulnerability framework to Ikisaya, we see the population there is highly vulnerable to climatic variability and change, as well as other stressors. This is due to a range of development challenges, and because of climate variability. (1) *Social and economic* structures includes lack of opportunities for formal employment, lack of infrastructure such as water access, electricity, roads, telecommunication network, sanitation, and health facilities. (2) *Political and institutional* structures in terms of historical marginalization by

<sup>8</sup> Kenya's education system is an 8-4-4 system with eight years of primary education, four years of secondary education, and four years of university. Classes in primary school are referred to as standard 1-8 and in secondary school as form 1-4.

government, lack of education and opportunities for higher education, few opportunities for information about and influence in national politics. (3) *Climatic variability and change* through high dependence on climate sensitive livelihoods such as agricultural and pastoralist activities and variable and unreliable rainfall. Through the provision of electricity, Solar Transitions seeks to enhance the adaptive capacity of people in Ikisaya so that they will be better equipped to deal with various forms of stress and thereby be less vulnerable.

## 5.2 Solar Transitions: an action research project

Solar Transitions (ST) is an interdisciplinary research project consisting of social scientists, technical solar experts, and stakeholders from development and solar energy agencies (University of Oslo 2013a). ST seeks to develop a model for small-scale solar energy systems in developing countries that provide affordable, accessible, and financially sustainable basic electricity services. The model should be viable in the long term, contribute to socio-economic development, and climate change adaptation. The goal is to explore the factors influencing people's opportunities to achieve social changes through activities connected to solar energy systems. ST explores how to implement, and socially organize, local energy supply in ways that benefits the population, including marginalized groups. A core element is south-south transfer. Firstly from India to Kenya, and secondly ST aims to develop a transferrable model that can be used in other places in Kenya and in sub-Saharan Africa (SSA) (University of Oslo 2013b). Villages in India and Kenya were chosen as case studies for the project. In India, the project investigated existing solar power systems in villages on the Sunderban Islands, because these systems were identified as innovative by solar energy experts (Ulstrup et al. 2011).

To find a suitable place in Kenya, the ST team visited and evaluated three villages in different locations. A team member suggested Ikisaya as she had done research there earlier (P#8). ST saw Ikisaya as an interesting place because of its

particular challenges as a poor, remote, drought-prone, and scattered village in SSA (Ulsrud 2010). Another important factor was that the local leadership in Ikisaya was interested in participating in the project. ST saw local ownership and participation as key factors for a successful implementation (P#8). ST initiated the process of designing IEC, using methods similar to those found within Participatory Action Research.<sup>9</sup> Participatory methods should ensure relevance by adapting the model to local conditions and needs expressed by the population in Ikisaya. Additionally, it sought to build local ownership so that the community could run the project on their own. On request from participants in Ikisaya a community-based organization (CBO), Ikisaya Energy Group (IEG), was established to run the Centre (P#8).

### **5.2.1 Involving the community**

The ST team developed the IEC model using the experiences from India and the information gathered through research activities in Ikisaya. The ST team conducted preparatory research activities in Ikisaya between October 2010 and until IEC opened on 20 March 2012. Activities included a baseline survey on socio-economic conditions and energy spending, meetings with local leaders, public meetings, essays from primary school pupils, and interviews and conversations with people in Ikisaya. After the interim board election in May 2011, the board and the ST team developed by-laws. The board, guided by the ST team, was responsible for the hiring process of three full-time and two part-time staff. Before the opening of the Centre, the staff participated in a nine days training program including a technical overview of the Energy Centre, book keeping, and a financial overview. Board members and the assistant chief were invited to participate in one of the days (Ulsrud 2012). Table 4 provides a simplified timeline of the ST project.

<sup>9</sup> Participatory action research is a popular variant of participatory rural appraisal (PRA) (Brockington and Sullivan 2003), which was presented in the theory chapter. Participatory action research is a large field in itself and is not the main interest of my thesis. Therefore, I will not go into the details of participatory action research in this study.



*Table 4: Simplified timeline of events for the Solar Transitions project (source: author).<sup>10</sup>*

Month/year	Activity
April 2009	Project start
October 2009	Fieldwork Sunderban Islands, India
February 2010	Fieldwork Sagar and Moushuni Islands, India
June 2010	Household survey Sagar and Moushuni Islands, India
June 2010	Ikisaya chosen as the Kenyan pilot village
June 2010	Baseline survey in Ikisaya.
August 2010	Case study on income generation in Ikisaya.
October 2010	Fieldwork Ikisaya 15–19 October: preparatory research activities and meetings with community leaders and groups.
October 2010	GPS coordinates of households in Ikisaya (local project assistants)
March 2011	Fieldwork Ikisaya 17–23 March: preparatory research activities.
May 2011	Fieldwork Ikisaya 22–27 May: election of interim board of IEG
October 2011	Fieldwork Ikisaya 16–19 October
November 2011	Fieldwork Ikisaya 16–21 November
December 2011	The board hires staff for IEC
February 2012	Fieldwork Ikisaya 3–12 February.
March 2012	Fieldwork Ikisaya 11–24 March: start-up phase for IEC, training and workshops for staff
March 2012	20 March: official opening of IEC
April 2012	Follow-up visit in Ikisaya
April	Follow-up visit Ikisaya 26–28 April
June 2012	Follow-up visit Ikisaya
August 2012	Follow-up visit Ikisaya
October 2012	My fieldwork in Ikisaya
November 2012	Follow-up visit Ikisaya
December 2012	Follow-up visit Ikisaya
February 2013	Follow-up visit Ikisaya
May 2013	Follow-up visit Ikisaya
July 2013	Follow-up visit Ikisaya

### **5.2.2 The Ikisaya Energy Centre model**

The IEC model aims to: (1) provide affordable and accessible electricity to various groups in the village, including the poorest; (2) be run as a community business that should become financially sustainable after the initial investment;

<sup>10</sup> Data collected from project documents, field reports, personal communication with the ST team, and Winther (2012a).

(3) serve as a pilot project for further transfer of knowledge of village based electricity supply in rural Kenya and SSA. The IEC can thereby be seen as a hybrid model seeking to create both social and economic value. As the IEC model aims for financial sustainability through trade of electricity services, and should reinvest surplus in social purposes, it suits the definition of a social enterprise (Alter 2007; Ridley-Duff and Bull 2011a).

### **5.2.3 Too scattered for grids: a charging station in the village**

Building a mini grid in the scattered settlements of Ikisaya was too costly. Therefore IEC is designed as a centralized charging station offering rental of electric lanterns, charging of mobile phones, rental of a conference room, daily showings of news and movies, and IT services such as printing, copying, and typing. Originally, the Centre had a daily charging capacity for 120 lanterns, 30 phones, and 20 small batteries. It powered a printer/scanner/copier, the TV/video system, and the lighting system for the Energy Centre (Muchunku et al. 2013). The demand in Ikisaya was not as high as expected. The ST team and the staff therefore decided to establish sub-centers in Malalani, Endau, and Kalwa. Some panels, batteries, and lanterns were moved to these sub-centers. Figure 6 visualizes IEC model, the services it provides, and the three sub-centers in operation in October 2012.

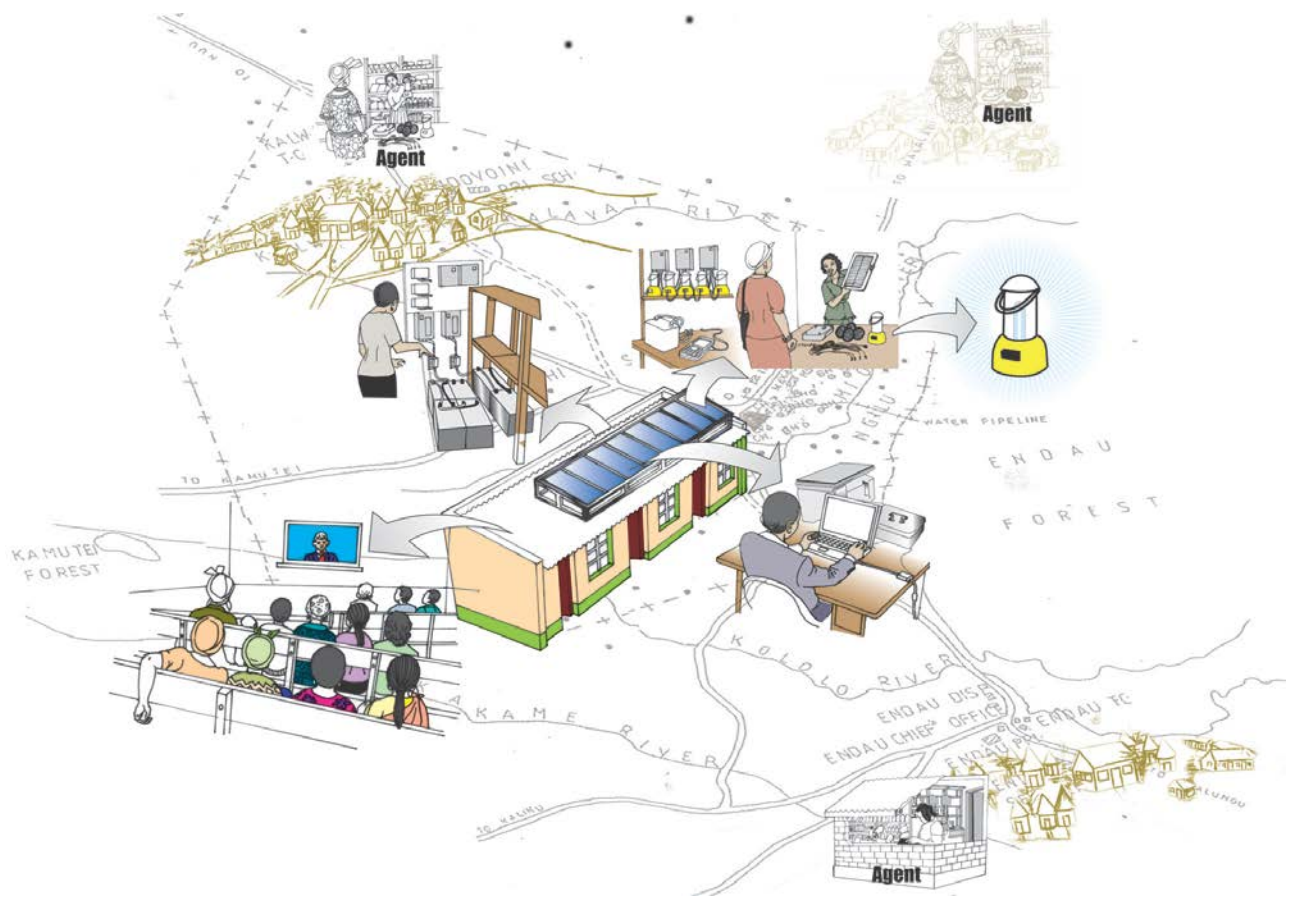


Figure 6: The Ikisaya Energy Centre and sub-centers (agents) (Mabwa 2013).

#### 5.2.4 Sustainability through participation: a community-based organization

The inhabitants of Ikisaya village run and organize IEC through the CBO. The by-laws state that you have to be an inhabitant of Syou sub-location and to register and pay the annual registration fee to be a member. The members elect the board in the annual general meeting. The board employs staff and overlooks the general running of the Centre. The staff reports to the board in meetings. Board meetings should happen every second month, while the executive board members (chair, vice chair, secretary, and treasurer) should meet more often. Members get information through public meetings (Solar Transitions Project 2011a). Figure 7 visualizes the organizational structure of IEC and the role of ST in Ikisaya.

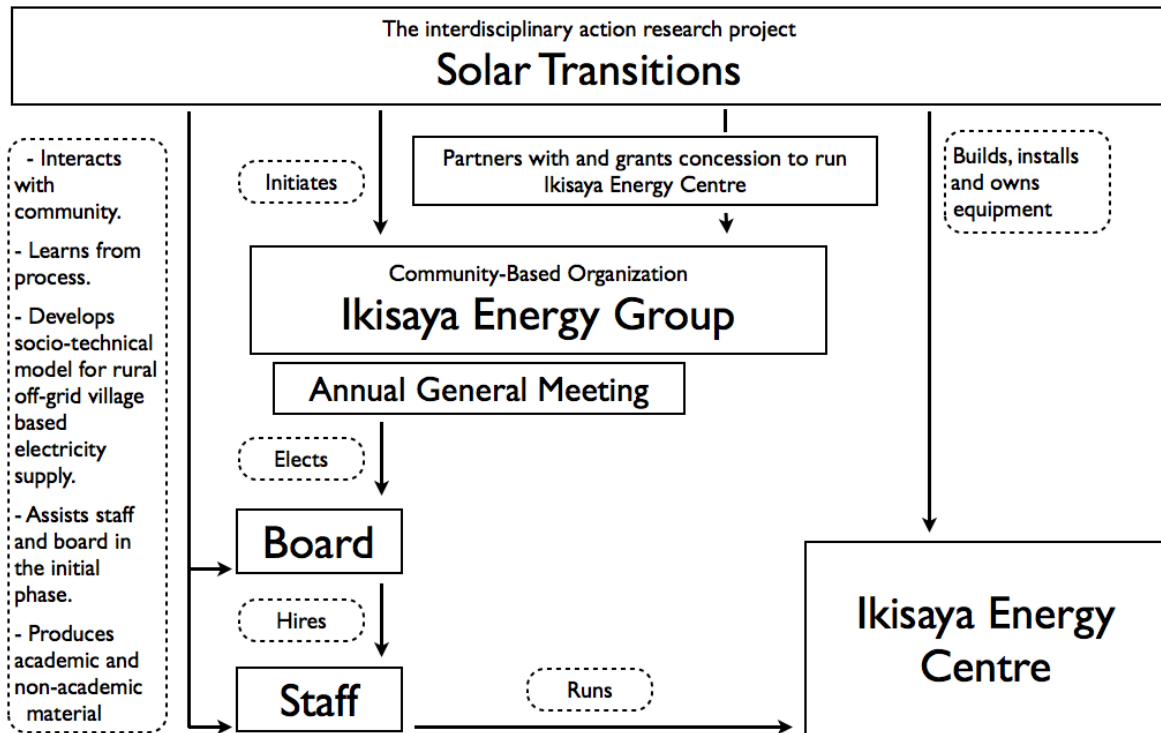


Figure 7: Organizational model of Ikisaya Energy Centre (source: author)

The ST team regarded clan disputes to be a major threat to the project. The different clans dominate different settlements (Winther 2011). Therefore, the board consists of representatives from all settlements in Ikisaya (Mauta 2011). An important element of the model is the transfer of ownership from ST to the local community. When the Energy Centre opened, IEG had a concession to run the Centre; while the equipment remained the possession of ST. According to the plan, ST should hand over the project to IEG within a year after the opening. This element is crucial because ST aims to make the project independent and sustainable in the long term. Moreover, as elaborated in the theory chapter, participation can generate other benefits, such as building social capital and empowerment in the local community (Mohan and Stokke 2000; Cooke and Kothari 2001).

### **5.2.5 Financial sustainability and access for all: a social enterprise**

According to the plan, the IEC should be financially sustainable after the initial investment. Thus, the generated income should cover staff salaries, running expenses, maintenance, and battery replacement. The ST team estimated that IEC would need KES506,000 (~USD5,819) every 2–3 years for battery replacement and other maintenance (Muchunku et al. 2013: 29). A Project Management Agreement was signed between IEG and ST. It establishes that minimum KES21,300 should be deposited to the maintenance fund every month from June 2012. Moreover, it lists responsibilities of the IEG and ST, stating that ST should assist the staff and the board in the initial phase, that IEG should operate IEC transparently, that IEG can, (with the approval of ST) use surplus for expansion of IEC, or for other development needs in the village, and that ST can take possession of all existing equipment and bank balances if IEG fails to fulfill its commitments (Solar Transitions Project 2011c).

To balance the social and the economic aspects of IEC, the prices of the services were balanced in accordance with ST's knowledge on income and energy expenditure in the village, and the need for IEC to be financially sustainable. While the preparatory research had showed that the poorest in Ikisaya generally spend very little on energy and would not be able to pay KES20 for lantern rental, ST found that this price was necessary in order to ensure the financial sustainability of the Centre (P#8). The field notes from the second fieldtrip to Ikisaya describe some of the challenges identified by the ST team:

- The need for balancing affordability of the services with keeping the project viable economically, by running it as a business.
- The need for balancing the business thinking with the thinking of equity and the common good for the community.
- The need to carry out sufficiently good training activities for those who will operate and maintain the solar power system.
- To create a strong committee/community based organization or a community owned company with a board that actively looks after the economic performance and operation of the power supply. (Ulsrud and Winther 2011: 4-5)

### 5.3 More than a research project

In many aspects, ST differs from traditional research projects. Firstly, the researchers took the role as innovators implementing a development project in the field. Secondly, the research brought valuable equipment and job opportunities to a deprived village. Thirdly, the project leader and main researcher who will be referred to here as “the initiator,” devoted substantial extra time, effort, and personal funds to the implementation of the project.

#### 5.3.1 A researcher, do-gooder, and social entrepreneur

The initiator writes her PhD about the ST project. In addition, she is the brain and heart behind ST. She initiated the project with a clear idea about what it should be and how it should look, carefully selecting and engaging an international and interdisciplinary team, and she coordinated the ST team.

The Norwegian Research Council funded the research component in the project, but did not fund the technical equipment for the physical implementation.

Therefore, the initiator spent a lot of time searching for additional funds for construction and equipment to implement the project. Several failed attempts at applying for additional funds delayed the project. Finally, the initiator decided to contribute with money gathered through friends and family and to relocate some project funding. Altogether, the construction and equipment of IEC amounted to roughly ~USD71,960<sup>11</sup> (P#9).

To write a PhD at the same time as you innovate, coordinate, and implement a transferable participatory development project in rural Kenya, demands a lot of time and commitment. The initiator said that she could not have done this project without strong internal motivation. ST team members, as well as staff and informants in Ikisaya, said that they appreciated her leadership of the project and

<sup>11</sup> Currency exchange rate 01.03.12: NOK1=USD0.1799 (Oanda 2013).

clearly saw her as the main driving force. She is viewed, and views herself, as the leader of both the IEC and the ST project.

In my interpretation, the initiator is driven by a mission to find viable ways to implement and socially organize accessible rural electricity supply. At the same time, the project in Ikisaya has become her personal commitment beyond just research. Despite a lot of work, difficulties, and disappointments on the way, it still seems she is willing to work hard to find ways to make basic electricity services at IEC accessible for everybody, including the very poorest. Therefore, I would argue that the initiator, in addition to being a researcher, is also an investor and a social entrepreneur. In one of the interviews, she reflects:

Ikisaya was a journey to the unknown in many ways...there was no recipe for how to implement such a project and a lot of unsolved problems in the field that we wanted to find solutions for. We have not yet managed to solve all those problems. Many people in Ikisaya cannot afford electricity yet for example...and I am not really happy before a lot more can get to use those lanterns (my translation).

### **5.3.2 A development project for the locals**

Historically, there have been few development projects the area, apart from a Belgian funded planting and seedling project that closed in the 1990s, a few water piping and road projects, and the drilling of two boreholes (Eriksen and Lind 2009). When ST initiated the project in Ikisaya, they emphasized to the community that they were doing a research project, in which they hoped the community would participate. Since funding was not secured, ST attempted to lower expectations in the community, as they did not know the potential outcome of the research project yet (P#9). Most people in Ikisaya, however, viewed IEC as a development project. Several informants expressed views similar to these:

Lan: What did you think when you heard that Ikisaya was getting the Energy Centre? HH#12a: It was good since this is a remote area and we needed such development. Lan: Why did you become a member? HH#12a: I wanted development to come to this place.

Lan: How did you get to hear about the Energy Centre the first time?  
HH#20: I heard from the man who came with a group of people. At a meeting, we were told that those people would bring light. Afterwards people went around in our homes for research asking us the advantages of having light. Lan: What did you think when you heard that Ikisaya was getting an Energy Centre? HH#20: I was very happy because I knew that that it is a development to the community.

This was a common perception even among ST's key contacts in Ikisaya. While the researchers saw it as a research project, the local population saw it as a development project coming with foreigners, which is discussed in chapter 6.

## 5.4 Summary

This chapter has provided a description of Ikisaya village, and outlined the history of the ST project, and the IEC model for basic rural electricity supply. I have also argued why I consider ST as more than just a research project. The inhabitants in Ikisaya are highly vulnerable to climate variability and change, as well as to other stressors, because of a range of economic, social, political, and institutional factors. Vulnerability is not equally distributed in Ikisaya and some people, such as single mothers, or those who work as casual labor, can be considered more vulnerable than others. The area lack basic infrastructure and the population did not have access to electricity before IEC opened in March 2012. IEC is a community-run social enterprise selling electricity services for subsidized prices. ST is not an ordinary research project. The initiator's engagement and investment in the project is considerably beyond the norm. She can be seen as a social entrepreneur, as she possesses qualities such as a deep engagement for a social cause. For people in Ikisaya, IEC is most of all a development project providing electricity to the village for the first time.



## 6. Social entrepreneurship and participation: a sustainable model?

When I arrived in Ikisaya on 8 October 2012, Ikisaya Energy Centre (IEC) had been operating for almost seven months. According to the plan, Solar Transitions (ST) should hand over the project completely to the community by April 2013, when the research project ended.<sup>12</sup> This chapter discusses the challenges on IEC's way to financial, organizational, and social sustainability and independence from the ST team. *Financial sustainability* refers to IEC's ability to cover running and maintenance costs, including replacements of batteries, while ST covers the initial investment in technical equipment and material. A presentation of income, expenditure, and savings accounts from April 2012 to June 2013 enables a discussion about the ability of the IEC model to achieve long-term financial sustainability in Ikisaya. *Organizational sustainability* refers to the ability of the community-based organization to function without the support of the ST team, including a discussion about leadership among the staff and the board at IEC, and the involvement of the larger community in Ikisaya. *Social sustainability* refers to the social acceptance of IEC in the local community and involves a discussion about local power relations, trust, and social capital in Ikisaya. This includes the implications of outsiders' involvement in local communities.

This chapter discusses and answers the following sub-questions: (1) In what ways have local power relations influenced the design, implementation, and operation of the IEC, and to what extent has ST challenged or reinforced existing local power relations in Ikisaya? (2) What is the relationship between ST and

<sup>12</sup> The new research project *Solar xChange* also involves Ikisaya and ST team members will be present in Ikisaya at least until 2015 (P#8).

IEC? To what extent do people in Ikisaya show leadership in the operation of IEC, and what are the challenges of participatory methods for realizing the transfer of a social enterprise? The chapter also gives a foundation for answering (3) To what extent has the IEC, through the selected business model, managed to combine financial sustainability with access to solar powered electricity services for the poorest in Ikisaya? This question will be further discussed in chapter 7.

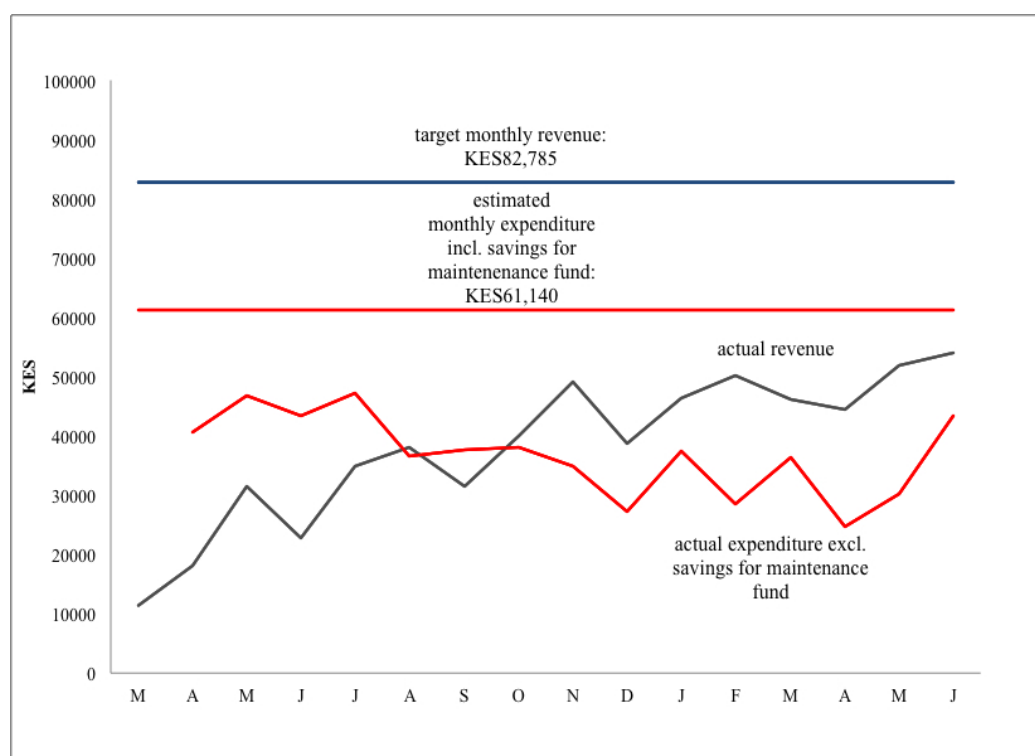
## 6.1 Financial sustainability

The ST team seeks to secure the provision of electricity in Ikisaya in the long term. ST is a limited research project without funds beyond the actual research and further funding is restricted. The ability of IEC to cover operation and maintenance costs is therefore crucial to ensure continued electricity supply in Ikisaya. Because ST aims for IEC to be a catalyzer for development in the area through self-financed expansion, the model is designed so that IEC will also be able to purchase new equipment. In the following, I will look into the economic performance of IEC from March 2012 to June 2013, and discuss the potential for IEC to achieve financial sustainability in Ikisaya.

### 6.1.1 Low economic performance

Ikisaya is a poor community where most people lack the resources to pay the market price for electricity. While the national grid will go through Ikisaya, only a few households in the village will be able to afford the connection (key informant). Before IEC opened, only a couple of households had private solar panels (Kirubi 2011). In the preparatory process, ST conducted surveys and interviews to adapt the prices to levels affordable for the majority of the population in Ikisaya. At the same time, the generated income should ensure operation costs, monthly saving for battery replacements, and provide a surplus for additional investments. However, 15 months after the IEC opened, revenue did not even cover expenses and battery savings. Figure 8 shows the economic performance of IEC from March 2012 to June 2013. Table 5 and 6 provides

average income and expenditure. According to the staff, the reason for the low turnover was that people generally lacked money due to three consecutive droughts. In addition, customers in Ikisaya complained about having to return the lantern to IEC after only two days (P#1 and Ulsrud 2012). For these reasons, many of the customers in Ikisaya did not comply with renting rules and often kept lanterns for more than two days.



*Figure 8: Monthly revenue and expenditure from March 2012–June 2013 in relation to target revenue and estimated expenditures at Ikisaya Energy Centre.*<sup>13</sup>

<sup>13</sup> Data in figure 8 and table 5, 6, 7, 8, and 9 was collected by author from account books and the accountant at Ikisaya Energy Centre 12 October 2012 and from IEC financial reports October 2012–June 2013.

*Table 5: Projected and actual revenue at Ikisaya Energy Centre.*

<b>Business section</b>	<b>Average monthly revenue April 2012–October 2012</b>	<b>Average monthly revenue November 2012–June 2013</b>	<b>Target monthly revenue</b>
Charging services: lanterns, batteries, mobile phones	21477	35004	54000
IT-services: photocopying, scanning, typing, printing	5980	6501	10095
Retail outlet (margins)	n/a	n/a	1710
Multipurpose room: hires, news, TV shows	3179	3671	16980
Other: certificates, barbershop, fines, envelopes	534	2365	0
<b>Total incomes (KES)</b>	<b>31170</b>	<b>47541</b>	<b>82785</b>

*Table 6: Projected and actual expenditure at Ikisaya Energy Centre.*

<b>Expenses</b>	<b>Average monthly expenditure April 2012–October 2012</b>	<b>Average monthly expenditure November 2012–June 2013</b>	<b>Projected monthly expenditure</b>
Salaries	28671	21783	30000
Agent commissions	1053	2886	0
Monitoring of sub-centers	1072	800	0
Consumables	6655	2909	10340
Administrative fees	933	936	500
Other costs	3174	3501	0
Maintenance fund	1667	15100	21300
<b>Total expenditures (KES)</b>	<b>43225</b>	<b>47915</b>	<b>62140</b>

A range of measures were taken to increase the incomes and reduce costs, including enforcement of fines for late returns, and customer information about why lanterns must be returned every two days (Muchunku et al. 2013). Staff salaries represent the highest expenditure of IEC. Initially the three full time positions and the two part time positions amounted to KES30,000 (~USD345); more than IEC's average income in the first six months. During the first months of operation, the ST team informed Ikisaya Energy Group (IEG) that the ability of IEC to create enough income would decide whether the Centre could keep the current number of staff (P#8). Two employees left IEC for various reasons during the first year of operation. By April 2013, the Centre had two fulltime and

one part-time employee (P#8). While salary expenses were reduced, other costs kept expenditures relatively high.

To sustain the services at IEC, the batteries need to be replaced approximately every second year. ST estimated that IEC needs to save KES21,300 (~USD245) every month to buy new batteries. As table 7 illustrates, IEC lacked almost half of the amount needed to ensure financial sustainability after 15 months of operation (IEC should have started monthly deposits by June 2012).

*Table 7: Deposits to Ikisaya Energy Centre's maintenance fund.*

		Depositor		Amount in savings account
		Ikisaya Energy Centre	Solar Transitions	
Deposit date	29.09.2012	10000	0	10000
	05.11.2012	16000	0	16000
	30.11.2012	14300	9500	23800
	31.12.2012	9000	0	9000
	31.01.2013	8000	0	8000
	28.02.2013	16000	0	16000
	31.03.2013	11000	0	11000
	31.05.2013	20000	0	20000
	30.06.2013	17000	0	17000
<b>Total amount in savings account (KES)</b>		<b>121300</b>	<b>9500</b>	<b>130800</b>
Target amount by June 2013 (KES)				255600
<b>Outstanding amount (KES)</b>				<b>124800</b>

### **6.1.2 Insufficient customer base in Ikisaya: establishing sub-centers**

Because of the low economic performance in Ikisaya, sub-centers were established in neighboring Malalani and Endau. Another sub-center was established in Kalwa because the far distance to Ikisaya market restricted people in Ndovoini and Kalwa from accessing the services. The sub-centers were run by agents, who got solar panels and lanterns from IEC. The agents charge the same amount for lantern rental, but take 20 percent of the revenue in commission. After the establishment of the sub-centers, the turnover for lantern rental jumped instantly (table 8). The sub-centers in Malalani and Endau were doing much better than IEC. Therefore, IEC increased the number of lanterns for the sub-

centers in Malalani and Endau throughout 2012 and 2013 and started phone-charging services there with the help of a small investment by ST (P#8).

*Table 8: Turnover from lantern rental at Ikisaya Energy Centre and sub-centers April–September 2012.*

Month (2012)	Ikisaya Energy Centre	Sub-centers			Total lantern revenue (KES)
		Malalani (open from 28.06.2012)	Endau (open from 05.07.2012)	Kalwa (open from 04.07.2012)	
April	5140	0	0	0	5140
May	9680	0	0	0	9680
June	8470	0	0	0	8470
July	6880	4120	8020	2610	21630
August	9200	3540	8480	1190	22410
September	7020	2920	9560	610	20110

IEC is dependent on richer neighboring villages and towns for a large bulk of its income. People in relatively richer areas thus use the services that were intended for people in Ikisaya. Although the need for electricity in Ikisaya is high, the IEC has not yet been able to achieve financial sustainability in the village. This questions the potential of a social enterprise to achieve financial sustainability in poor and remote communities, or to reach out with basic services to the very poorest.

## 6.2 Organizational sustainability

IEC is an enterprise owned by a community-based organization (CBO), Ikisaya Energy Group (IEG). IEG is a complex organization where the members are the owners and main stakeholders. The board is elected by the members in the annual general meeting and thus represents the community (see figure 7). While the staff runs the business, they report to the board, which report to the members. Therefore, good communication between staff, board, and members is crucial to ensure a strong and functioning organization. Moreover, the board and the staff must take leadership of the project before the ST team withdraws. In the following, I will discuss the organizational sustainability of IEC.

### **6.2.1 Leadership of the staff and the board**

During the first year of operation, the ST team assisted the staff in the daily operation by paying several visits to Ikisaya (see table 4). In addition to the follow-up visits, the initiator phoned the staff regularly to support them in the daily operation. Since the termination of one employee in October 2012, she has been in contact with several of the employees on a weekly basis.

At the time of my fieldwork in October 2012, the staff, the board, as well as people in Ikisaya, still leaned on the ST team for making decisions about the running of IEC. The staff showed little leadership and independence from the ST team. The board remained passive, and the members of IEG were frustrated because of a lack of information. The staff waited for the follow up visits by the ST team before changing anything, taking decisions related to the running of IEC, or gaining knowledge about the economic situation. In general, the organization was weak and the community had not taken leadership of the project.

#### *The complexity of a community-based organization*

Communication was a major issue throughout IEG. The staff did not have regular meetings with the board, there were no regular board meetings, and the board did not arrange meetings for the members of IEG. By October 2012, public meetings had only been organized when the ST team was present and initiated them. The by-laws state that the board should meet every second month, and that the annual general meeting, including election of a new board, should be arranged every year (Ulsrud 2012). Yet, the board had not met or arranged any public meetings since May 2012. They did not take on their roles as the leading body of the organization and the communication link between the staff and the members.

The board has the main responsibility for how the Energy Centre is performing financially and organizationally. However, the ST team did not prioritize following up the board. After the staff were hired and the initial model was

finalized, ST's primary focus was on training and following-up the staff (P#9). Because of time pressure and aiming to make the learning process as efficient as possible, only the five staff members were included in the full nine-days training session before IEC opened. Board members and the district administrator were invited to participate only on one of the days. The community at large were not included at all in this training process, restricting the main stakeholders of IEG in their ability to control the board and the staff (P#9). Apart from this training, and a few meetings between the ST team and the board, there was little communication between the board and the ST team after the opening of IEC. Therefore, the board members might not have been fully aware of their function and responsibilities. These responsibilities should include the overview of the economic performance of the staff and to inform the members of IEG about the progress at the Centre.

The lack of community meetings after the opening was a result of a wish by the ST team for the board and the staff to take responsibility and leadership, and the failure of the board and the staff to do so. Moreover, there was a perception among some members of the ST team that sharing too much information with the community would lead to tedious and irrelevant discussions. Therefore, systems to inform the community about the performance of IEC were not put in place (P#9). The result was that while the community was heavily involved in the preparatory research process before IEC opened, it was largely left out after the opening. Thus, in reality, seven months after the opening, the IEC was not operating like a CBO, accountable to its members. The ST team did not focus on the board because the board did not seem to function well. Therefore, the team wanted to ensure that the staff would not be dependent on a functioning board (P#8). However, as the board and the community expected to be included, the failure to establish a good meeting structure created frustration among board members and within the larger community. The lack of information made them



feel excluded from their role as decision-makers, creating suspicion within the community (see section 6.3).

The community expected to be included since they had been included in the preparatory process and had been told that the IEC was a community project. Thus, the frustration was a result of unmet expectations by community and board members that they would continue to participate, caused by the disproportionate relationship of participation and inclusion of the community between the periods before and after the opening of IEC. The involvement of the community in the preparatory process was important in understanding the needs of beneficiaries and the local context of Ikisaya. However, the CBO structure may be both unnecessary and confusing, as the ST team did not prioritize creating a strong organizational structure after the opening of IEC.

#### *No leadership: dependency on Solar Transitions*

Although the staff were the primary focus group of the ST team, they did not take leadership of the project during the period of my fieldwork. The staff made few decisions by themselves. They did not take the initiative to arrange board meetings or public meetings. They had scant information about the customer base, and took little action concerning economic performance. Thus, the staff did not act as if they were running a business, but rather as governmental service providers. As one ST team member said:

Currently, as the staff are paid fixed salary, which is not dependent on their performance, it seems there is no business going on in Ikisaya. They are acting like they are working for the government. Target based remuneration will motivate the staff to perform better and will bring in more revenue to the Centre (P#11).

While the agent in Malalani cleaned her lanterns every week and ensured that they were well placed in her shop, lanterns at IEC were not kept clean, or organized, to attract customers. The room where the lanterns and cell phones are charged (and customers are served) was messy, and the lanterns were dirty. Staff

showed little incentive to gain knowledge about, or to improve to the economic situation, and did not seem to know that they were making far less of their lanterns than they could. The turnover from lantern rental was less than one third of the potential (table 9), yet a common perception among the staff, board, and community in general, was that there were too few lanterns and that IEC needed more of them to increase income and meet demand.

*Table 9: Number of rental days per lantern in September 2012 at Ikisaya Energy Centre and sub-centers.<sup>14</sup>*

	<b>Ikisaya Energy Centre</b>	<b>Sub-centers</b>			<b>Total</b>
		<b>Malalani</b>	<b>Endau</b>	<b>Kalwa</b>	
Number of lanterns	87	24	41	8	160
Revenue from lantern rental	7020	2920	9560	610	20110
Number of rental days per lantern (max 15)	4,0	6,1	11,7	3,8	6,4
Number of lanterns rented out to their full monthly capacity	23,4	9,7	31,9	2,0	68,2
<b>Utilization of monthly capacity (%)</b>	<b>26,9</b>	<b>40,6</b>	<b>77,7</b>	<b>25,4</b>	<b>42,6</b>

Lantern rental needs to be at 63 percent to reach the revenue target. As table 9 shows, IEC only reached 27 percent, while the sub-centers in Malalani and Endau pull the total lantern revenue up to 43 percent in total. The large majority of their customers in Malalani and Endau are shop owners, who are situated nearby the sub-centers. Malalani and Endau are richer than Ikisaya. There is more money in circulation, and more people visit, bringing money from the outside. Therefore, shop owners here probably have more income than shops in Ikisaya and these sub-centers may have more stable customers than IEC. Another

<sup>14</sup> IEC got 160 lanterns in total from ST. Some lanterns were sold, but not all the sales were visible in the accounts. The initiator also bought around 30 additional lanterns. The staff did not have an overview of the total number of lanterns at IEC when I was there, and it was not easy for me to count them as not all were in at the same time. By October 2012, there were probably more than 160 lanterns in Ikisaya. However, as these uncertainties make it difficult to know the exact number, I stick to the original number of lanterns at IEC by March 2012. According to the information I got at IEC and at the sub-centers, the sub-centers in Kalwa, Malalani, and Endau had 73 lanterns by October 2012, leaving 87 lanterns at the IEC. Lanterns are rented out for KES20 for two days.

reason may be that the agents get 20 percent in commission, which gives them a personal incentive to get as much out of their lanterns as possible, as I will discuss later.

Instead of trying to maximize the revenue from their existing equipment, staff and board members were rather focusing on getting more equipment. They also mentioned a desire for other costly investments such as opening a hair salon, opening centers in other villages, and getting a motorbike. Hence, there was an expectation that the ST project would pay for additional equipment. This indicates a general lack of understanding that IEC should be financially sustainable after the initial investment. It also indicates that people in Ikisaya, including staff and board members, viewed IEC as an external development project, rather than a community project. Although the ST team had informed the staff of the need for, and tried to encourage them to, increase revenue and deposit money to the maintenance fund, ST also continued investing in the project through providing pension when reducing the number of staff. ST was also bringing new equipment, and helping to top up the maintenance fund. These continued investments, and the lack of a clear deadline for when IEC would be on its own, may have resulted in the lack of leadership and responsibility among the staff. The staff might rather count on the continued help from ST, than making the effort to increase the revenue and fill the maintenance fund. Thus, the lack of clarity and exit strategy may have led to dependency rather than responsibility and leadership among the staff.

To save time, the ST team bought the equipment and made a plan for the expenditure and income of IEC without involving the staff. Therefore, the staff did not have the knowledge and experience about how to replace equipment. They were not trained in how to organize, plan, and budget. This was a concern among staff members before the opening of IEC (P#9). The ST team decided on the number of staff, the salaries, the budget, and the prices for the different

services before the staff were employed. ST did most of the work from their offices, without the involvement of the staff or the community at large (P#8). Issues like working hours, book keeping, and salaries, were still discussed with the staff (P#8). Hence, the ST team still has the decision-making power over employment, cost, and income at IEC and is therefore still leading the project, while the staff is operating it. While the staff could have done more to obtain knowledge about why the revenue was low during my fieldwork in October, they actually had very little room for real decision-making, which may in part explain why they had not taken leadership of the project.

### *Lack of economic responsibility*

Because of low revenue, and (partly) a lack of willingness to deposit money in the bank by some staff members, the staff has banked far less than needed to purchase new batteries (see section 6.1). If IEC fails to save enough money for battery replacement, it will in principle have to close down when the batteries are worn out (after ca. 2 years). However, if the staff should fail to save enough money by the time the batteries need to be replaced, the initiator has communicated to them that she is willing to help them because she does not want to project to close. As emphasized by one informant, action research is a learning process and therefore it is tempting for researchers to have a flexible threshold for investment and involvement with the community (P#11). However, the staff's lack of initiative to increase revenue might be attributed to the failure of the ST team to clarify when the project would stop investing in IEC. An ST team member, with extensive experience in implementing off-grid models for electricity supply, emphasized the need for clarity about when and how the ST team pulls out of the project to avoid aid dependency and to ensure leadership within the community:

I think that many research projects tend to make that mistake. We think it is an action research project and we go on investing maybe not to benefit the community, but to benefit our learning process...we have to find a

balance between the two. It is important for us to learn, but that should not treat the community as like they can't do anything and we have to come back with more investments...then you can actually restrict the growth of the community. You should not make them feel like that they can't do anything without any support. In the long run, it might create problems for them (P#11).

The lack of real consequences of not achieving financial sustainability could be the reason why the staff did not work harder to increase the income of IEC. This might have been the situation in the micro-grid project described in chapter 2. Although the project had been running for 10 years, the business performed much better when the external organization pulled out completely (Kirubi et al. 2009). One staff member did express that he thought the staff would be forced to take more responsibility when the ST team left (informal conversation 16.10.2012). The initiator also said that she thought that some staff members were not doing their best to increase revenue because they were aware that she would probably help them anyway. Mosse (2001) and Olwig (2012) emphasize that participatory projects may rather create dependency, than empowerment in communities. One way to make the staff understand the consequences of the lack of revenue, and thus create local leadership, ensure financial sustainability, and avoid dependency in Ikisaya, can be to have clear communication with the community about when the ST team will stop investing in the project. As emphasized by a ST team member:

We have to find a mechanism by which they can fill up their battery account (maintenance fund) and we have to very clearly communicate that while we are not asking a return of the investment, we are definitely asking that they have to forward their own initiative. In case they can't do that, then tomorrow again they will have to go back to darkness and nobody will come forward and provide them with anything at that time. So it is a choice between future darkness and future brightness, so the community has to decide on that (P#11).

### *The need for personal incentives or rare individuals*

The lack of revenue from lantern rental in Ikisaya was partly due to non-compliant customers who kept lanterns at home for more than two days at a time.

Largely, the staff did not enforce fees for late returns because they felt uncomfortable confronting non-compliant customers and perhaps because they were not aware of the range of the problem. Most operating staff members are relatively young and a reason for the reluctance of the staff to confront customers might be their relative status compared to some customers. However, the same person who was responsible for lantern rental at IEC was responsible for the sub-center in Endau. As illustrated in table 8 and 9, the difference in lantern rental revenue between Endau and Ikisaya is striking. Thus, the lack of initiative in Ikisaya might also be because the staff did not have a personal incentive to maximize the income.

The staff in Ikisaya were paid a monthly wage, while agents were paid on commission. Thus, agents had a personal motivation to maximize the lantern rental. The performance of the staff depended on their personal engagement in fulfilling the social mission and their accountability towards their constituency (IEG). Largely, this trust-based model did not work in Ikisaya as several among the staff were tempted to take money for personal gain (P#8). Most staff members have not shown the sense of leadership needed for starting up and running a social enterprise.

One of the staff members at IEC differs from the others. Through interviews and conversations with her, and with ST team members, she stands out as an interesting example of a potential transfer of social entrepreneurship. She strongly emphasizes a vision to serve the community, and shows a balanced understanding of the economic situation of IEC and peoples' economic situation in the area. When confronted with peoples' requests to lower the prices, she expressed that she wanted to keep the prices in order to ensure the financial sustainability of IEC (Grøtvedt 2013: 13:53). Thus, she understands the dual aspects of the hybrid model and the responsibility of the staff to ensure the continued provision of services. On several occasions when talking or writing

about IEC to others, and to me, she has expressed the view: “I have learned how to serve the people...my desire is to continue helping them (people in the community) and assisting them when necessary (P#3). After she became the manager of IEC, she showed a strong leadership and vision for the Centre. According to the initiator, she has been working hard and long hours to explain the regulations and prices to the customers and to increase revenue. She takes responsibility, worries about, and acts on the economic situation. The initiator expressed: “It has demanded a lot from her, but she succeeds because she has been very wise, while it has been difficult for others to be strict enough” (my translation).

The initiator has worked with three different managers at IEC since March 2012. She emphasizes that the chemistry and individual relationship between her and the person, as well as the motivation of the person in charge, is crucial for the model to work:

I think that the direct contact between the managers and me has been important, but also how the individual communication has been. Now the communication is much easier, and I think her motivation resembles mine more than the others’ motivation. I think personal relationships have a lot to say in activities like these (my translation).

As emphasized by Schumpeter, Dees, and Ashoka, the combination of personal qualities of social entrepreneurs, including a high sense of engagement and ethics, are rare (Schumpeter 1928; Dees 2001; Ashoka Innovators 2013). Most people, whether they are rich or poor, do not have these qualities. Ikisaya is a poor place with few opportunities for formal employment. Many within the staff may have viewed the project as an opportunity for getting money for food and school fees, rather than to engage in a social mission to provide electricity to the community. Identifying the special individuals who are willing to work hard for the common good in a given community is difficult, especially for outsiders like the ST team. A more business-focused model, based on personal incentives, will be at the cost of the social aspect (provision of electricity to all). However, it may

be more viable and scalable to base models on economic incentives than on values like personal engagement.

### **6.2.2 Creating dependency?**

The intervention by ST in Ikisaya did not seem to increase the ability of the community to cooperate. In the tense situation that developed during the course of my fieldwork, the community seemed to wait instead for the ST team to fix the situation, than to handle it on their own. Although the conflict was related to IEC, the root of the conflict was related to existing disputes between different clans and political constellations within the community. Instead of using the traditional structures for conflict solving, such as the council of elders or government representatives, the problems were avoided until the ST team's arrival. For example, these two informants felt uncomfortable addressing some issues they, and several within the community, had with the management of IEC. Therefore, they wanted the ST team, or someone from the outside, to address these issues:

You know, the problem is...I don't know if you can start a research?  
(asking me) You know that people should bring out that topic, but it is very sensitive and you cannot come up with it as a person unless it is written as an agenda somewhere. Not to come from a person, but generally from somewhere. We want this change. The community has already talked and we want election for this thing to be finished.

The ST team contributed to solving the above-mentioned dispute. ST thereby played an important role in managing and sorting out a conflict, which preexisting institutions within the community had vast experience in solving (Eriksen and Lind 2009). These incidents may imply that the external intervention to implement IEC made the community less empowered to drive their own development. However, the inability of the community to deal with conflicts may only be temporary and colored by the particular situation. During the past months, the ST team had visited the village often and members within the community knew that the team was coming in just a few weeks. Moreover,



staff members had referred to the ST team when confronted with dissatisfied customers. When the ST team becomes more distant, or in other situations, traditional structures to handle conflict within the community may function adequately.

### **6.3 Social sustainability**

Any development intervention happens within a social context and can have both intended and unintended consequences. To have the support and acceptance of the community is crucial for both the financial sustainability and the organizational sustainability of IEC. Reversely, when using a CBO model, organizational strength is also important to achieve social acceptance. As discussed above, the failure to create good communication and information routines between the community and the staff/board, resulted in distrust and suspicion and thereby threatened the social sustainability of the project. This was triggered by the fact that three people with important positions in the project came from one family with a strong position in Ikisaya. Moreover, the presence of researchers, or outsiders, has come to represent one of few sources for jobs, income, and opportunities in the village. Combined with underlying factors in Ikisaya, such as a general sense of distrust towards fellow villagers, and a history of clan disputes, these combined factors contributed to fuel the conflict that played out during my fieldwork. This section will discuss the social sustainability of IEC.

#### **6.3.1 Elite captured?**

Individuals with close family ties held the two most important positions in IEC (chairman of the board and manager of IEC), and one position within the ST team. These individuals had also been important advisors in the planning process when the IEC model was developed. Several individuals within this family were important gatekeepers to the village, as well as key informants for the ST team.

They used the opportunity to secure positions, employment, and income for family members through IEC and ST.

Communication between the ST team, the board, and the staff could, and in fact did, happen between the three family members. Combined with the lack of a good communication structure within the CBO, these close family connections made people suspicious that this family were taking advantage of their position at IEC. Within the community, many claimed that the family had gotten too much power in the project, and that the IEC was turning into a family business. This perception was based on several incidents. For example, the chairman of the board did not call for board meetings and arrange for an annual general meeting to have new board elections. Moreover, the manager had both the code and the keys to the safe where the income of IEC was kept. Therefore, many suspected the family members of pocketing money from IEC. According to a local leader and several informants, this was a big issue within the community. It contributed to making most of the community want to “pull out” of the project (meeting 01.11.2012). One informant explained:

I cannot see the positive role of that man. He brought the good thing, but it benefitted the family.... When you were coming, they were not even calling the members to sit down and involve them to say that the visitors were coming. They decided themselves. They decided even to employ the drivers themselves. They choose themselves. That is the complaint of the community now (HH#5).

Rural elites can play an important role in community development, as they use outside networks to bring projects and resources to their communities (Williams et al. 2003). As we can see from the statement above, people in Ikisaya also recognized the role that individuals in this family had played in getting the Energy Centre to Ikisaya. However, they got frustrated because the family used the opportunity to allocate jobs, and money, for their own benefit.

Disputes between clans, and political constellations, have a long history in Ikisaya. Members from various clans have tried to undermine other clans' projects before the arrival of ST (Owour et al. 2005; Eriksen et al. 2005). The community might have been cautious towards this family because it had been particularly powerful within the district for several generations (key informant). On the other hand, community members had elected many of the executive board members when the candidates were not present, including members of this family. Members of the family were thus elected democratically (P#7, key informant, and Mauta 2011). The executive board members all held important positions within the community before they were elected, showing that the population had also trusted elites and local leaders to lead the IEC. According to a key informant, the reason for the conflict within the community was not that people had a problem with the family's initial involvement in IEC, but that things were not done in the right way: "In Ikisaya, it is important to do things in the right manner. If not, everything becomes a mess within two hours." Moreover, he said that conflicts in Ikisaya usually rise and fall rapidly, which seems to have been the situation in this case. During a follow-up visit by the ST team, it was revealed that the manager had taken some money from the safe. This led the ST team to terminate him immediately, which, coincidentally, also resolved the family triangle between the board, the staff, and the ST team. After this intervention, IEC seemed to quickly regain trust within the community and the conflict calmed down (P#8).

The tyranny-critique highlights that powerful members within communities often get too much influence in participatory projects (Hildyard et al. 2001; Mosse 2001). This is often referred to as "elite capture" (for example Hickey and Mohan 2005). Because the board had representatives from all settlement clusters, and all the big clans, people across political constellations and clans got information about the lack of communication and initiative from the board. This enabled the community to mobilize quickly when they felt that IEC was not

operating in a way that would serve them. The tension within the community was growing so fast, and strong, that I find it likely that the community would either have solved the issue or that many people may have stopped using the services, leading to an undermining of the business. Thus, the situation described above can either be seen as an example of elite capture, which was stopped by the ST team, or that this family was “captured” by the community while the elite were trying to take control of the project.

The situation shows that clear communication, guidelines for handling money and resources, and organizational structure are crucial for the social sustainability of community projects. In Ikisaya, the ST team’s understanding of the local political context contributed to creating good structures, which can enable a check and balance effect of the power of local elites. Hence, a thorough understanding of the local context can be crucial in order to sustain local support and avoid elite capture when implementing community projects like IEC. The Indian case study in Williams et al. shows that it is not always necessary to have democratic representation in community projects if people have other arenas for voicing their views (Williams et al. 2003). Thus, the need for well-functioning structures in participatory projects will always be dependent on the local context. Another factor that needs consideration is that interventions by researchers or outsiders in poor communities are not only costly, but might also be a source of conflict in themselves, which I will discuss in the following section.

### **6.3.2 Researchers, opportunities, and jobs in a poor community**

Opportunities for formal employment are rare in Ikisaya. The perception of how people in the village benefitted from IEC was strongly connected to the opportunities for people in the village to get paid work. When people said that they thought IEC was turning into a family business, they connected this with the family’s ability to get jobs and to make an income from activities connected to IEC, as one informant stated: “I am not happy because it is only three people

who are able to get the opportunity of jobs there. Now the rest is for the family. So, I am not happy because of that” (HH#13b).

As researchers often need translation, transport, housing, and food, researchers also mean jobs in Ikisaya. Moreover, researchers from rich countries like Norway do not only represent a source of immediate income, they also represent important networks and opportunities in terms of financial help for education or other investments. Before the arrival of researchers in the early 2000s, Ikisaya had been quite isolated from the outside world. Several of the researchers who have been to Ikisaya have helped people they connected with there with for example money for education, which is seen as a way out of poverty in Ikisaya. The people who interacted with the early researchers also became important gatekeepers and research assistants when the researchers from the ST team arrived. Moreover, the people who cooperated closely with the ST in the preparatory process got jobs at the IEC later.<sup>15</sup> Separately, these actions are probably quite normal ways for researchers to contribute to communities and individuals that have given them valuable insight and shown them hospitality in the field. These factors added up, in a poor and isolated community like Ikisaya, unsurprisingly cause researchers to be seen as important sources of income and opportunity. Thus, their presence can trigger local conflicts. When a long-term research project like ST is initiated, this study shows that it is important to avoid becoming too closely connected with one family, to have various gatekeepers, and to vary where researchers live and who they spend time with.

### **6.3.3 Low social capital: trust in Ikisaya**

Ikisaya has a range of formal and informal institutions where community members interact and cooperate. Formal institutions include school boards for the

<sup>15</sup> The board was responsible for the hiring process and it happened in an open manner where applicants from Ikisaya and outside Ikisaya were invited to apply. The board had invited two external persons from the neighboring villages to ensure a fair process. Connection to Ikisaya and motivation for the project was regarded as important qualities (Winther 2012b).

two primary schools, church boards, the water committee, the village elder's council, and the Kenyan Women Trust Fund (a nation-wide organization). Most people are members of several informal institutions and organizations, such as self-help groups. Despite this vast range of bonding networks between village members, the ability of the community to run IEC together was, as we saw in the previous section, quite low.

During my fieldwork, I experienced that people, in general, seemed to have little trust in others. Many told me that they were reluctant to disclose their monetary income because they were scared of getting robbed by fellow villagers and even close family members could be accused of stealing money. Several informants talked of fellow village members as “tricky” or “cunning”, and not to be trusted. This was particularly obvious between members of different clans or political constellations (field notes). Social networks seemed to be largely confined to relatively closed groups of friends and family and to a lesser extent between one another. This lack of trust and interaction might explain the low ability of the community to act collectively and cooperate in managing the IEC. Therefore, it can be argued that the population in Ikisaya lacks social capital, which is seen as crucial for enhancing social development and adaptive capacity (Putnam 1995; Adger 2003; Rodima-Taylor 2012).

The literature on participatory development and the literature on social entrepreneurship both emphasize the potential of the respective approaches in contributing to build social capital (Mohan and Stokke 2000; Praszquier and Nowak 2011). Strong ties within communities, crossing gender, religious, ethnicity, and socio-economic status, give a sense of identity and common purpose. However, without such ties, outside networks can serve the narrow interests of the powerful. Social ties and networks played out as nepotism may be harmful for excluded individuals and groups, weakening trust and reciprocity, and thus hindering communities' ability to act collectively (Woolcock and

Narayan 2000). Moreover, it may be difficult to build social capital in societies with little trust (Praszkier and Nowak 2011), and social capital may actually be reduced if collaborators cheat or take advantage of the project (Cope et al. 2007 in Ridley-Duff et al. 2011). The findings from Ikisaya in October 2012 suggest that the intervention by ST in Ikisaya created dependency and extended existing distrust between community members. The result was that the community was less able to act collectively. Thus, the project did not strengthen community ties. According to members of the ST team, the situation is different now (P#8 and P#10) and at least one of the staff members seems to have taken leadership of the project (P#8). It will be interesting to see whether the effects of ST, in the longer term, will increase social capital and enable adaptation through creating an environment for innovation and collective action (as emphasized by Osbahr et al. 2010; Rodima-Taylor 2012; Scheffran et al. 2012), or if it rather creates a sense of dependency and distrust in the community.

## 6.4 A sustainable model for Ikisaya?

In ending this chapter, I seek to answer the three sub-questions: (1) In what ways have local power relations influenced the design, implementation, and operation of the IEC, and to what extent has ST challenged or reinforced existing local power relations in Ikisaya? (2) What is the relationship between ST and IEC? To what extent do people in Ikisaya show leadership in the operation of IEC, and what are the challenges of participatory methods for realizing the transfer of a social enterprise? Chapter 7 will discuss the financial sustainability of IEC and its ability to reach the poorest.

### 6.4.1 Local power relations and Ikisaya Energy Centre

Local power relations may have influenced the design of IEC, as the ST team connected with one family in particular, which acted as gatekeepers and had important positions in the project. This created distrust within the community, and may have contributed to weaken social capital rather than building it.

Clan affiliation is an important factor in the social life in Ikisaya. Prior to the ST project, previous research had revealed that internal disputes could be a potential threat to the project. Therefore, the ST team had ensured that the IEC board members represented various clans, families, and political constellations within the village. Moreover, the extensive participatory activities in the village had created a strong sense of ownership among the larger population in Ikisaya. Community members expected to be informed of, and included in, decisions made about the Energy Centre. When they did not get information and felt excluded, a conflict emerged. Dissatisfied board members engaged their friends and families within the village. Had the ST team not intervened, this conflict may either have led to a solution, or undermined the project. Thus, having a representative board ensured a check and balance effect which may prevent elite capture or dominance in the project. Although one family might have had too much influence in the project, I argue that the ST team's thorough knowledge of the local context in Ikisaya, and the democratic and representative CBO structure, limited the influence of this family in the project. Therefore, the participatory activities and the democratic CBO structure of IEC can be said to have challenged existing power relations through ensuring broad ownership and a check and balance effect of local elites.

#### **6.4.2 Challenges of participatory projects and transfer of leadership**

In October 2012, the IEC staff and board had not taken leadership in the project. They did not have an overview of the reasons for the low turnover, and seemed dependent on the ST team to make decisions concerning IEC. This might partly be because the staff had very little decision-making power in the project, as the ST team had developed the model, including income (prices and equipment), and expenditure (number of staff and salaries). The project might thus have created a sense of dependency among staff members. Instead of running the enterprise in a responsible manner, the staff lacked initiative to increase revenue. Some staff members pocketed money, and thus prioritized short-term personal benefits over



project sustainability and social value for the community. To run a social enterprise, like IEC, demands a special kind of leadership, engagement, and ethics in the form of accountability towards the constituency, as described by Dees and Ashoka. These rare, inner qualities and values are not easy, or perhaps, possible to transfer. The CBO model used in Ikisaya requires that the staff will do their best in trying to sustain the project for the common good, and that they will not take money from the project. This trust-based model is dependent on finding these rare individuals, and has largely not worked in Ikisaya. It is not a given to find such individuals in (any) communities. As one ST team member said: "We think that people are so altruistic elsewhere, but we are not so altruistic ourselves" (P#9).

In October 2012, the IEC had been operating for seven months. By comparison, in the micro-grid project explored by Kirubi et al. (2009), the community only ran the project completely on their own after 10 years. Ten years of continuous follow-up and economic support for one community project is not ideal if the goal is to provide electricity to rural communities on a large scale. On the other hand, the 1-year time limit of handing IEC over to the community proved too short. In pure economic terms, the participatory model with a CBO structure, such as IEC, is too tedious and costly for large-scale off-grid rural electrification. Moreover, the model is too dependent on especially engaged and motivated individuals both on the donor side and in the local community. However, ST is a learning experience for the ST team, aiming to develop a transferable model for rural electricity supply. The time and resources spent on establishing IEC must be justified on those terms.

One challenge of participatory projects identified in this study, is to balance between following up the staff and investing in the project to make it work, and to give the staff the sense of ownership and responsibility required to take leadership in the project. The lack of a clear deadline for when the investments

from the ST team should stop, and a proper exit strategy, might be limiting the staff's incentive and sense of urgency in taking responsibility to ensure that the project is sustained. The staff's responsibility for the continued access to electricity for the community is a serious one, but as the Kirubi et al. case study indicates, they might not take this responsibility if they are not forced to.

### **6.4.3 Community-based organization or business approach?**

The community-based model implies that the main goal of IEC should be serving the community at large rather than maximizing profit. Thus, the IEC model holds the social above the business aspect. As the primary goal of the organization is not to create as much profit as possible, but to provide electricity to as many people as possible, the prices only need to ensure the financial sustainability of IEC. Therefore, the prices are kept as low as possible to maximize accessibility—social value.

Creating interactive spaces for community members can have positive effects such as increasing empowerment, social capital, and democratization (Cooke and Kothari 2001; Cleaver 2001; Wollebæk and Selle 2002). Local participation and democratic governance can be seen as ways to ensure inclusion of the poor and marginalized in communities (Eriksen et al. 2011). The empirical data presented in this chapter suggests that the creation of a CBO may not in itself have led to an increased ability for the community to cooperate during the first months of operation. Rather, the community seemed unable to lead the organization, or to handle conflicts. However, as several community members did express dissatisfaction about not being included, the participatory process might have created a sense of empowerment and democratic education within the community. This might have led to either the failure of the project or the solution of the conflict, if the ST team had not intervened.

The CBO structure was chosen partly because the local leadership in Ikisaya suggested it (P#8). However, while the set-up of the IEC board was sensitive to

the local context in Ikisaya (clan disputes), the community seemed largely unable to handle the conflict that arose during my fieldwork. Moreover, the CBO structure demands a strong organization. Despite initiating the election of a board and the creation of by-laws in the preparatory process, the project did not function as a CBO. This was partly because the board and the staff did not follow-up on the by-laws, and partly because the ST team did not prioritize building organizational strength. For the CBO structure to work, more attention should have been paid to the organizational aspects of the IEC model. However, it would have demanded even more resources and work from the ST team, which may not have been possible due to time and budgetary limitations. The dissatisfaction may have been avoided if the organization had not been set up as a CBO, as the members would not have expected to be included. As the CBO component of the model was not followed up on, it might have been easier to choose an approach where the community were not stakeholders. However, a pure business approach might negate the social aspect as the person might focus on making as much money as possible, rather than providing electricity to as many as possible. A contractor model, with regulations related to prices and services could have been another option, simplifying the organizational structure and ensuring the social aspect. On the other hand, a contractor model would have required continuous follow-up by the ST team.

#### **6.4.4 Trade offs in participation**

Several of the discussions above illustrate the trade offs that practitioners have to make when engaging in participatory development. Firstly, the staff and the board were largely not included in the process of searching for funds, developing the model, or buying the equipment of IEC. This led to lack of understanding of the model and lack of leadership. While inclusion could have enabled the community to take leadership, it would have been close to impossible to include the staff, the board, or other people in Ikisaya in this process, due to time, budgetary, and communication constraints. Secondly, the close follow-up of the

business aspect of IEC (the staff) neglected the building of a strong organization, leading to social discontent and confusion among board members, and members of the CBO. Thirdly, convenience and time constraints might have led to the failure of ST to build strong bonds with more than one family, so giving this family too much control of the project and fostering discontent within the community. Fourthly, the ST team's ownership of the project and their wish to sustain it, led the ST team to continue the investments in Ikisaya when the IEC failed to produce enough income. This may contribute to creating further dependency and reliance on external donors, rather than the ability for the community to drive their own development.

This study exemplifies why participation, or externally initiated development projects, can never, fully, be a bottom-up process (as in Nustad 2007). The ST team came to Ikisaya to implement a project of which the means and preferable ends were mainly given in advance. The ST team, rather than the community, was the main driving force of the project. Moreover, this study questions how participatory projects can find the balance between efficiency and participation. In the following chapter, I discuss to what extent IEC has led to vulnerability reduction in Ikisaya across groups.

## **7. Social value in Ikisaya: Ikisaya Energy Centre and vulnerability reduction**

While most people in Ikisaya are poor, a range of factors, including access to land, clan and family networks, education, gender, health, and age determine the vulnerability of individuals and households. Ikisaya Energy Centre (IEC) and its sub-centers are charging stations without grids. Access to electricity services is therefore also influenced by geographical distance. This chapter explores to what extent Solar Transitions (ST) has contributed to vulnerability reduction in Ikisaya (sub-question 4). It looks at the impact of IEC on: (1) livelihood diversification and (2) empowerment, well-being, and social capital, especially in terms of increased opportunities for education, the creation of new identities and connection to Ikisaya, and the impact of light on human security, or in enabling new meeting spaces. It also answers sub-question (3): To what extent has the IEC, through the selected business model, managed to combine financial sustainability with access for to solar powered electricity services for the poorest in Ikisaya?

### **7.1 Opportunities for livelihood diversification**

Livelihood diversification can contribute to vulnerability reduction because it makes people less dependent on climate sensitive sectors such as agriculture and pastoralism (Klein et al. 2007; Adger et al. 2009). The provision of electric light can increase productive hours and thus increase people's opportunity for income generation and in diversifying their livelihoods (Jacobson 2007; Kirubi et al. 2009; Cook 2011). IEC and the sub-centers in Kalwa, Malalani, and Endau, have had a significant effect in increasing opportunities for income generation. The access to electric light enabled longer opening hours for shop owners, and increased productive hours in general. However, access to lantern rental is largely confined to shop owners and those with a regular income. Despite

subsidized prices, many among the poorest inhabitants of Ikisaya are not able to rent lanterns.

### **7.1.1 Impact for shop owners**

In Ikisaya market, where IEC is situated, there are around 15 small shops selling groceries, vegetables, food, and tea. Kalwa lies on the outskirts of Ikisaya, around 10km from Ikisaya market, and its small village market has around five shops. Malalani is bigger and is the district headquarters, while Endau is a small town, and big compared to Ikisaya and Malalani. Shop owners in Ikisaya have several income sources. They also engage in farming activities, livestock keeping, various productive self-help groups, and make handicrafts for sale. Compared to those getting fixed governmental salaries as teachers, administrators, and those with jobs in the urban centers, most of these shop owners are also very poor. However, they have a more reliable way of obtaining cash throughout the year in comparison to those who rely only on farming, livestock, and casual work to get money. Most of the regular lantern customers at IEC, and the sub-centers, are shop owners (see section 7.6). Their shops are located in the immediate environment of IEC and shop owners have more access to money. In addition, lanterns represent a direct source of income for shop owners, as I discuss below.

#### *Increased opening hours and income*

Before IEC opened, most shops in Ikisaya used to close at nightfall. In Malalani and Endau, some shops usually stayed open a little longer, using kerosene lamps. After IEC opened, shop owners in all locations told me that they had increased their opening hours by approximately two hours on average. A common perception of most of my informants (shop owners and non-shop owners) was that increased opening hours resulted in more customers and more income for shop owners. Although some shop owners did not want to say whether they had more income than before, they did respond having more customers than before. Some shop owners said they made an extra profit of KES150-KES500 per day.

By comparison, a teacher can make around KES20,000/month (~USD230) (key informant), and the highest paid staff at IEC made KES8,000/month (~USD92) (October 2012). Moreover, the shops that had used kerosene lamps earlier said that they saved money using the electric lantern from IEC. While the lantern is KES10/day (~USD0.1), one informant said that he used to spend about KES60/day (~USD0.7) on paraffin (HH#4a).

### *Chores at night and extended working hours for women*

Access to electric light increased general productive hours and enabled shop owners to cook, care for livestock, wash clothes, prepare grains, weigh groceries, make the accounts, and other productive activities during the dark hours.

At the house the lamps makes it possible for me to do chores as washing the clothes and the house when I return from the shop at night...Whereas before I used to close the shop earlier to do them (SH#5).

Women are mostly responsible for the shops and most chores at home, in addition to preparing and taking care of the field, whereas the men usually take care of the cattle. Thus, the access to better light mostly extended the total working hours for women. However, several women I interviewed viewed this as a positive change because they could increase their income.

### *Business and drought*

Although the access to electric light did increase opening hours and income for the shop owners, shop owners are dependent on the general income of the people in the village. They are therefore affected when people have little money. In October 2012, the area had experienced three consecutive droughts. Most of my informants said their last harvest had been smaller than usual. Selling livestock is a common coping strategy in Ikisaya and some of the poorest said that they had sold their last goat one or two seasons ago. As it was at the end of the dry season, many people did not have much money or food left. Therefore, many of the shop owners found it hard to say whether having the lamp resulted in more income, as people had less money than usual. In general, there is not much money in

circulation in Ikisaya, as very few people have access to formal employment, or a regular salary. As one informant said:

...the only season when they sell the maize or honey so those are the season they have money and after that season you remaining with the very few people that are working like the teachers. So you see that there is no income. And this area has no factory, nothing else, no soldiers; it is only the teachers and the school like that one (pointing to Ikisaya Primary School) is just eight teachers. (HH#4a)

While shop owners are less vulnerable than non-shop owners, they are also vulnerable to climate variability and change both affecting farming and livestock activities and the income from their business activities. On the other hand, people in Ikisaya are now spending money on renting lanterns at IEC instead of purchasing paraffin. As a lot of the income of IEC is spent on salaries to people who live in Ikisaya, the establishment of IEC may have led to increased cash circulation in Ikisaya. In addition, the IEC is one of few places in the area with typing, printing, and copying services. Many local politicians used the services during the campaign for the national elections in March 2013 (field observations). Quite a few informants mentioned that people used to come from other places to use the services. Thus, the existence of IEC might lead to some catalyzing effect, as the services attract people from surrounding villages and thus contributes to additional cash flow to Ikisaya.

### **7.1.2 Emergence of new businesses and potential for social change**

According to Osbahr et al. (2010), local entrepreneurs and innovators can foster innovative activities and adaptation in local communities. The establishment of the IEC, and the empowerment of the staff to run it, could have played this role in Ikisaya. However, there were few signs of new entrepreneurial activities in Ikisaya during my fieldwork. One new business started in Ikisaya as a direct result of IEC; a carpenter who lives around four kilometers on the other side of Endau had opened a workshop in Ikisaya market. As there was no carpenter in Ikisaya, he was initially hired to make the furniture for IEC before it opened.



Recognizing the relatively higher business potential for him in Ikisaya than in Endau, he moved his business to Ikisaya. Taking orders from people in both Endau and Ikisaya, he makes more money and has more jobs than before. Although he probably takes more money out of Ikisaya than he brings in, he contributes to making Ikisaya more vibrant and interesting for other businesses, and thus less deprived in the long term.

An interesting finding is that although the IEC situates in Ikisaya market and the participatory process was mainly conducted there, the scope for new business innovation seems larger in Kalwa. The two shop owners in Kalwa I talked with had both developed innovative ideas for making money with the lantern from IEC. One of them invited local groups to have meetings in his café in the evening. The other told me that she used the lantern to serve passengers waiting for the matatus (private mini-buses) at night. Both added up to KES600 (~USD7) in sales per week. Moreover, I was told that a person was planning to open a pool table business in Kalwa (HH#23). Kalwa is situated around 10km from the IEC. Most inhabitants do not go to Ikisaya on a regular basis and participated relatively little in establishing IEC (see section 7.6). The difference between Ikisaya and Kalwa is striking because the literature on participatory development and on social entrepreneurship highlight the approaches respective potential of catalyzing social change (Cleaver 1999; Skoll 2009). While the establishment of a social enterprise and the participatory process did not lead to further innovation and entrepreneurial activity in Ikisaya, the mere provision of cheap light seemed to have more effect in Kalwa.

## 7.2 Impacts on education: a brighter future?

To save enough money to educate your children is a core worry in Ikisaya and the most important focus of caretakers. In Ikisaya, where only the teachers and the district administrator get a regular salary, giving children a good education is seen as the only way to ensure a regular income so that they can get better lives

and support their parents when they get old. Education is thus viewed as a way out of poverty and marginalization. While those who can be seen as the elite in Ikisaya are educated and have worked, or work, outside the village, the poorest sometimes exclude themselves from decision-making bodies partly due to lack of education (see section 7.6).

Before IEC opened, the only sources of lighting after dark were kerosene lamps, flashlights, and firewood. Kerosene is expensive. A flask of 300ml kerosene costs around KES60 (~USD0.7) and might only last for around four hours. Many families cannot afford to supply their children with kerosene for studying every night. Therefore, children had to read by the dim and smoky light from the firewood. Some children used to come early to school to do homework in the morning, or they did homework in the early afternoon (P#3). However, homework was not a very common practice before the arrival of IEC, as this pupil explains:

It is hard to forget how life was in Ikisaya before the opening of the Energy Centre. It was very tough, especially to students when learning. We used kerosene lamps and sometimes there would be no money to buy kerosene. It also destroys our eyes, leaving us blind while too young. When our parents could not afford kerosene, we used fire, which made us breathe the dangerous gas produced by the firewood (Essay#4).

Kerosene produces smoke that irritate eyes and skin and cause nausea and headache (Chilcott 2006). This affected pupils' ability to study (Essay#8). The preparatory research activities of the ST team found that there was no tradition of doing homework in Ikisaya because many families could not afford kerosene. Moreover, pupils often did not have time for homework due to household chores and to helping fetching water during the dry season. The ST team did not find it likely that homework practices would change overnight due to the increased access to lanterns provided by IEC (Ulsrud and Winther 2011). Contrary to ST's expectations, IEC has had a significant influence on children's education in Ikisaya in various ways. Most of my informants told me either that they rented

the lantern so that their children could study better, or that they knew someone who did. Both primary schools rented lanterns to arrange evening studies for some of their senior classes. In Ikisaya, Kalwa, and Malalani evening tutoring and homework groups were established. A pupil wrote this in her essay:

The establishment of Ikisaya Energy Centre affected my life positively because now I have enough time to learn without difficulties when doing my homework, or when studying during prep time, and there is no high use of money for buying kerosene. Now we are happy to see such improvement from Ikisaya Energy Centre, and we are ready enough to use the lamps to make our future life as good as we can (Essay#10).

### **7.2.1 Evening classes and private teaching**

Both primary schools in Ikisaya had started daily homework classes for their senior pupils after the IEC opened. Renting lanterns from the IEC, the school contributed to increasing pupils' possible homework hours by between three or four hours every day. As the children were now in school and not at home, they would rather spend time on homework than on doing house chores. Moreover, it is an opportunity for the pupils from poor families who cannot afford to rent lanterns regularly. However, the children who live far away from the school cannot attend evening classes, as it is too dangerous for them to walk home in the dark.

Several private teaching practices, which schoolteachers get paid to tutor pupils in the evenings, had also started in Ikisaya and Kalwa since IEC opened. While two new teaching practices had emerged in Ikisaya, there had been some private teaching earlier in Kalwa. According to one informant, these were now more popular due to the relatively better light of the electric lanterns (HH#6). The costs for private tutoring could be KES1,500–2,000/month (~USD17.3–23) for two siblings (HH#23 and HH#6). In Kenya, pupils are ranked according to their exam results. According to parents, primary school pupils in families who prioritized paying for private tutoring and rented the lantern for their children to study quickly improved their ranking in class. Some of the parents told me that

their children had made radical improvements. According to informants, their children had climbed from position forty to fifteen, nineteen to fourteen, eighth to fifth, and fifth to first (chosen examples). This correlates with the findings from educational research in Kenya, where pupils who were given homework and had their homework corrected, did better in school (Hungu and Thuku 2010). As elaborated in chapter 5, the admission to secondary and tertiary education depends on the pupils' score in national exams. Therefore, improved environment for homework might give children in Ikisaya better chances for getting admitted to higher education. Improved educational levels can lead to long-term benefits for Ikisaya in terms of increased access to remittances, knowledge, networks, and personal resources, and is generally seen as important in reducing vulnerability (Smit and Pilifosofa 2001). Compared to the findings of Jacobson (2007), where the electricity from solar home panels was mainly prioritized for TV use, the centralized solution of the IEC model provide relatively better opportunities for more productive uses of the electricity including homework and income generating activities.

### 7.3 Changing identities: “just like Nairobi”

To get an energy center and to be at the center of attention in the area, due to the ST project, has created a new sense of identity, and connection to Ikisaya among the inhabitants. People expressed that they were proud and happy after IEC opened and that “development had come to Ikisaya.” As only 5 percent of rural Kenya has access to the national grid, electricity and bright light is connected with cities and urban areas. This was expressed by many of my informants, who compared Ikisaya with Nairobi. One informant said: “We have been hearing about light from very far from big towns, but now we can see it very near“(HH#21), while another said: “we used to think that you could only access light when you go to the bigger towns, but now we feel equal” (HH#3). This view was also reflected in one of the essays from Ikisaya Primary School: “Now

Ikisaya is a very big town because most of the people come from a very big distance to buy those lights” (Essay#5).

Another aspect that was important to my informants was “to be seen” by people from other surrounding villages and towns. Several people said that they were proud of Ikisaya and that people were coming from far (the neighboring villages) to see the Energy Centre and use the services. One man stated: “When they pass and see Ikisaya, they now see a good place” (HH#11). A woman said that it made her feel “so good” that people from other places came to Ikisaya: “We have now a good name and I am proud of that” (HH#9), while another stated: “It has brought fame and we are receiving more visitors” (HH#12a). Yet, another woman said: “The Energy Centre has benefitted me personally because generally even from far, people know that Ikisaya has an Energy Centre” (HH#9). People in neighboring villages were also asking me why Ikisaya got the Energy Centre instead of them (Informal conversation 24.10.12). Or as one IEC staff member said in the documentary about IEC: “People are jealous about it and they ask whether they can get a Centre like this one of ours” (Grøtvedt 2013: 16:28).

To have good light was seen as important when arranging larger functions, such as funerals or meetings, when having visitors, or just to show to the neighbors. As one informant expressed: “When you had functions in a place like this, you could not gather people in the darkness, but now you can rent many lanterns and get a lot of light” (HH#5). One woman said that while she used the torch to cook, she liked to have the lantern outside (HH#12b). Maybe for her, as a poor person in Ikisaya, it was connected with higher status to be able to have good light, and therefore she wanted to put the light outside so that people could see it. Another woman said:

I decided to become a member because the light is good. When I get visitors, I take the lantern to my place to light, to have a good light for my visitors (HH#17).

From being an unnoticeable poor village between the rural town Endau and the district head quarters Malalani, the establishment of IEC has put Ikisaya on the map. People from neighboring towns, as well as other places in the district, come to see, visit, and use the services of the Centre. To know that people from other places envy them and acknowledge that Ikisaya exists made informants feel good. Hence, having electric light is connected to development and status both in terms of Ikisaya as a place, and on the individual level, leading to increased well-being and a feeling of inclusion in the modern world for people in Ikisaya. Sen emphasizes the freedom of people to achieve what *they* see as the good life (Sen 1999). In Ikisaya, people viewed a good harvest, health, and access to money to provide food and education, as important aspects of their well-being. However, non-material aspects of well-being, such as being acknowledged, or envied, by people from surrounding villages, providing light for visitors or to show neighbors that you have light, are also important to people. Similarly, many of the women in Ikisaya wished to have a hair salon at IEC to braid their hair. Having an identity of being developed might thus contribute to changing poor peoples' view of themselves and empower them to drive their own development. Therefore, non-material aspects of well-being can also be important in reducing vulnerability to climate change in poor communities such as Ikisaya.

#### 7.4 Less social exclusion: TV and electricity

In Ikisaya, people's mobility is restricted as most people do not have access to motorized transport and they travel by foot. Even the outskirts of Ikisaya, or neighboring villages and towns just 10–20km away, were seen as far away for many of my informants. In rural and deprived places without electricity, people are not just physically restricted by poor road quality and lack of money to travel, but also through lack of information about what is going on beyond the village. As one informant said: "Some of the people here have never seen a TV before. Now it is very new. That is a development for us" (HH#14). With access to TV

and daily news shows at IEC, people felt more included as citizens of Kenya and in the world. As expressed by this informant: “When I watch the news, it enables me to know well about my country, about what happens that day...I feel so good, because now I know well about all over the world” (HH#24). Similarly, one man said that Ikisaya was now a better place to live because he could watch the TV. Further he said:”I was very happy because I have been seeing the world. I have been seeing something from far nearby, through watching” (HH#13a). Although this man said that he often watched the news, he was the most interested in watching football. Watching football matches was mentioned by many of my informants as something that made them feel good. As watching football is not necessarily a productive activity, but rather something that can make people feel included in a larger context, this adds to the point about well-being above.

Access to TV also enables people in Ikisaya to follow, for example, election campaigns more closely, and might contribute to reducing social and political exclusion in Ikisaya. Moreover, people in Ikisaya also emphasized how they and their children had become enlightened after the opening of IEC. They thought that exposure to technology like electric light, equipment at IEC, and the computer, would enable their children to do better in school and have better opportunities in life. One informant expressed:

The children had not seen a TV and light so it brought enlightenment. Then the children are using it for their studies both at school and homes...it has helped my children because they have seen the light and TV at this age, unlike others (HH#12a).

In Kenya, the national tests for school certificates are sometimes based on knowledge that children in rural communities do not have, for example the colors of traffic lights (Kirubi et al. 2009). Access to TV can therefore enable children in rural communities to gain knowledge about the outside world and so do better in national tests. Computer literacy was especially important for many in Ikisaya,

and several of my informants expressed a wish to have a computer training school for their children.

After my children will finish school, like the one finishing form 4, I will take that boy there to be trained and when he will go to the university, he will go there with knowledge of the computer (HH#5).

Access to TV and exposure to electricity can, through limiting social exclusion and creating empowerment among the population in Ikisaya, contribute to vulnerability reduction.

## 7.5 More activity in village markets

In Ikisaya, Malalani, and Endau, my informants emphasized that the access to light had increased activity in the village markets. One shop owner in Ikisaya said:

Before, people were few during the night, but now they are there because of the security of the light. After they finish watching the news at nine, they all pass here taking food, taking tea (HH#9).

“Ikisaya has changed” was a recurring expression among my informants in Ikisaya. In Endau, the effect on town life seemed to be even more significant. Business life was said to be “booming” after people started renting lanterns. One informant said: “Earlier people used to move around without any purpose, now they seem to be more focused” (SH#5). Across all the locations, my informants talked about the lanterns as exposing them to a new life. “It opens our minds, in Endau we have never seen such lights,” one business owner told me (SH#2). Also in Malalani, my informants talked about increased activity in the village. Here, many highlighted that the local bar extended opening hours and that there were more people coming there. Most people going to the bar are men, and increased alcohol consumption might not be very beneficial for women, or for the family at large.



Increased access to light in all three locations was said to create more security, opportunities for meeting places, and interactions between community members. As the shops were open longer, more people stayed around, and there was more activity at night. Shop owners in Ikisaya said that they thought people felt more secure because people were less likely to steal or fight when other people could see them. People could therefore stay in town longer. According to several informants, there were fewer fights at night, less rapes, and fewer robberies than before. One said that the stealing had “disappeared completely” and that she could now even hang up her clothes without fearing that someone would take them (HH#9). Several of the women also told me that they felt more secure walking at night, and one informant thought that there were more women in Ikisaya market after dark than before (HH#3). It seems as if the increased possibility of being caught resulted in less crime and violence. When I asked if the situation for women had changed in Ikisaya, one informant said: “Even the bad behavior has changed. You know you cannot do something which is not good being seen” (HH#9).

## **7.6 Access for the poorest and distant communities**

In this section, I discuss whether the IEC model can be a suitable model for universal access to basic electricity services in poor places with scattered settlements, as in Ikisaya.

### **7.6.1 Geographical constraints**

Due to the cost of a mini grid in Ikisaya, IEC was built as a charging station without grids to the individual households. IEC is situated in Ikisaya market, which is the main meeting point in the village (see map 2). Customers have to travel back and forth to IEC to get and deliver lanterns, or to use other services. IEC is close to Ikisaya Primary School and to the common water point where all, except the inhabitants of Ndovoini and Kalwa, get their water. Therefore, the thought was that customers could get water and a lantern at the same time (Vogt

2013.04.02). As mentioned earlier, there might be benefits connected to having a charging station model for electricity supply. While solar home panels are mainly used for TV watching (Jacobson 2007), the electricity at IEC is mainly used for charging lanterns leading to more productive activities. However, as we can see from figure 9, the geographical distance is a hindering factor, affecting customers living outside the immediate location of IEC to access the services.

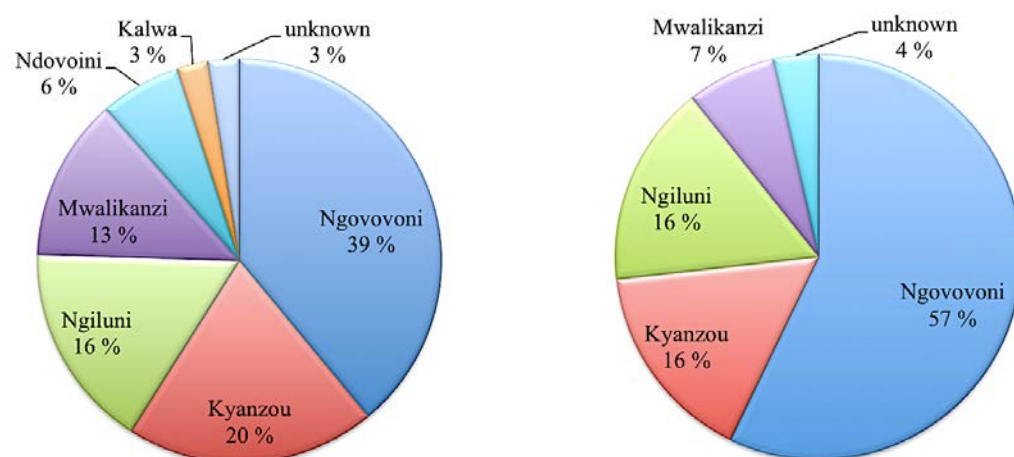


Figure 9: A: Registered members per settlement cluster (left). B: lantern rental customers per settlement cluster during sample periods in July and September 2012 (right).<sup>16</sup>

Map 2 shows where each of the settlement clusters of Ikisaya are located, while the points on map 3 show where the various households in Ikisaya are situated. The points on the map give an overview of where the homesteads in Ikisaya are located relatively to the IEC. While map 3 shows that settlements in Ikisaya are relatively spread out, and that many are situated near Kalwa and Ndovoini (far from IEC), most registered members (figure 9, left), and customers at IEC (right), live in Ngovovoni, which is where IEC is situated. Thus, geographical

<sup>16</sup> Data collected in cooperation with staff at Ikisaya Energy Centre in October 2012. The data on the location of the households of IEC members were retrieved from only one source in Ikisaya, a village elder and former research assistant, who was known to have very good knowledge of the community. However, these data could not be triangulated and are therefore not rigorous. For this reason, the data presented in figure 9 can only be seen as illustrative. Figure 9B does not include lantern rental in Kalwa and Ndovoini as customers here probably rented lanterns from the agent in Kalwa and I did not go through his receipts for the sample periods. However, as there were only 8 lanterns at the sub-center in Kalwa, and map 3 shows that there are a high number of households in this area, the use in Kalwa and Ndovoini cannot have been excessive.

distance is restricting customers from using the services at IEC. One factor may be that there are more shop owners in Ngovovoni than in the other settlements, and that these shop owners have more income and direct personal gain from using the lantern than those without a shop. Another may be that people in Ngovovoni have more knowledge about the IEC, since ST conducted most participatory activities there (P#9). However, it is important to understand the time stress that people in Ikisaya live with every day. Poverty, dependency on multiple livelihoods, and the lack of sufficient infrastructure and storage facilities for food, results in most days being filled with chores such as providing meals, getting water, looking after the animals, and preparing the field. When people spend many hours every day just to get a few liters of water, it may be difficult finding the time to walk many kilometers to get good light. One staff member confirmed that most users live near to the Centre:

Those who are near our Centre are using it mostly. We have other members that are far. That is about 6 km. They are not using our properties. Most customers are just within walking distance (P#1)

The two most distant settlement clusters are Kalwa and Ndovoini. People in Ndovoini and Kalwa are less informed about the services at IEC and its organization. Some had never been inside IEC. As none of my informants from these settlement clusters talked about the ongoing conflict around IEC, the distance might hinder them from participating in the general discussions in Ikisaya. Due to time constraints and convenience for the ST team, most of the participatory activities had been organized in Ikisaya market, sometimes on short notice (P#9). Thus, the distance may have restricted people from Ndovoini and Kalwa from participating in meetings in Ikisaya. Many only knew about the project from occasions when the ST team went around to the various settlements to talk about the project and ask people to become members. This is also reflected in membership statistics. As we can see from figure 9, the majority of registered members are from Ngovovoni, while only a few are from Kalwa and Ndovoini.

### **7.6.2 Access for the poorest?**

ST aims to reach out to the whole population in Ikisaya, including the poorest. The ST team therefore attempted to find prices that would be affordable for all and at the same time would ensure financial sustainability. While, the ST team knew that many families could not afford to spend KES20 on lantern rental, the price was found necessary to ensure the financial sustainability of IEC (P#8). This has affected poor people's ability to utilize the services at IEC. While few of my poorer informants rent lanterns, the shop owners are the most important customers. Through information from the sub-centers and a sampling of lantern rental customers at IEC, I found that around 73 of the regular lantern rental customers were shop owners. This is a significant proportion as only 68 of the lanterns were rented out to their full potential in September 2012 (see table 9). In Ikisaya, lantern rental seemed to be restricted to a small portion of the population. During two sample periods (15 days in July and 14 days in September), I found that only 57 individuals had rented lanterns. Only 20 of these had rented lanterns seven times or more (the maximum rental days per month is 15). At least eight of these 20 customers were shop owners.<sup>17</sup> One informant stated:

There are two groups, two categories of people. There are those that have money, others they don't have enough money. Those who have, get the services, the others, they don't get (HH#11).

The lack of money was evident among most people in Ikisaya, and especially among female-headed households, and those who depend exclusively on casual labor and farming to obtain cash. I made an effort to interview people who were seen as poorer. While nine of my informants can be seen within this group, only two told me that rent the lantern. The light was helpful for them as both claimed

<sup>17</sup> The technician at IEC and I went through all the receipts for lantern rental in Ikisaya for the periods: 1–15 July and 1–14 September 2012. When I discovered the methodological mistake, we tried to find a day to go through the receipts for September 15. Unfortunately, we could not find time. As lanterns are rented out every second day, I do not think that a one-day inconsistency has a significant influence on my results.

to have doubled their rope production (HH#12b and HH#13a). I targeted these two specifically because I knew, from the statistics gathered at IEC, that they were renting lanterns often and wanted to know how they, as relatively poor women, utilized it. As these were the only ones among my poorer informants who rented the lantern, it seems the poor are less able to access the services of IEC.

In general, people, including very poor informants, said that KES20 for two days was a fair cost compared to the price of kerosene. However, many did not have money to spend KES20 on kerosene every second day. Some of my informants said that, even though they were members of IEC, they did not rent the lantern because they did not have KES200 for the lantern deposit. Many of the poor informants said it would be easier if they could take the lantern and pay later. This shows that, despite the subsidized prices at IEC, some people in Ikisaya are just too poor to pay even small amounts of money to access electricity. As touched on in chapter 5, there are wide differences in energy use within Ikisaya, which is also true among those within the poorer segment of the population. While one informant was just using about KES40 on kerosene or flashlights in one month, another said that she was using KES120 a week (HH#17 and HH#18). For people spending just KES40 on lighting per month, spending KES20 every two days can be considered a luxury. However, the informant spending up to KES120 a week spends more money than it costs to rent the lantern from IEC. She said that she knew she was spending more on kerosene than she would have on the solar lantern. However, she did not have the money to register and then to be sure to have money for renting the lantern every second day.

Moreover, as an early attempt to increase the turnover of lantern rental, and to meet customers' worry about not getting a lantern, the staff launched a system where people could permanently reserve a lantern for their household by writing

their name on it. The result was twofold. Firstly, as most people did not rent their lantern every second day and nobody else could rent their lantern (as it was reserved), the turnover of lantern rental was low and some people who wanted to rent the lantern did not get the chance. Secondly, some of the poor households did not rent the lantern at all because they were scared that they would not have KES20 to spend every second day and did not dare to commit. Poorer people may be more scared of not complying with the rules of IEC because they often have to depend on goodwill from fellow villagers (as explained in the case study in Williams et al. 2003). While most of the lantern-renting customers did not comply with the agreement to rent the lantern every second day, the poor didn't dare to take the risk of non-compliance and therefore did not rent the lantern at all.

After consultations with the ST team, the practice of reserving lanterns for customers was abolished, making it easier for the poorer customers to rent the lantern occasionally. Although the poorest are unable to rent the lanterns frequently, most of my informants had used IEC at some point since the IEC opened. ID cards are a prerequisite for accessing governmental food relief programs or to be able to vote. Before IEC opened, people had to walk far distances to get copies of their ID cards, or other important documents. As we saw in section 7.2, the children from poor families living near the primary schools could benefit through increased homework hours. Thus, although the poorest might have less access to rent the lanterns than others, the IEC did benefit the poor population in Ikisaya through time saving, education, increased well-being, access to information, exposure to electricity, less violence and crime, and increased opportunities for networking and strengthening trust and social relationships within the village. Moreover, as the poorest will most likely not be able to connect to the national grid, this flexible model, where poor people can access basic services for a low price when they can afford it, is more accessible.

### **7.6.3 Exclusion and lack of participation in decision-making**

The participatory activities conducted in the preparatory research process consisted of public meetings and group interviews in Ikisaya market. Also, interviews and visits to households, including some poor households. Some group interviews included elderly women, who are often among the poor and vulnerable in societies like Ikisaya. Further, the pupils in a school class wrote essays for the ST team, which gave the team access to thoughts across income, status, and other dividing factors. It was also a focus of the team to ensure that women spoke in public meetings (P#9). However, as most activities and interaction with the community happened in public meetings and groups, the poorest populations and other marginalized groups, as well as those living far from the Ikisaya market, may have been excluded from participating in voicing their opinions and needs, which I will discuss here.

The poorest populations in Ikisaya struggle a lot in their daily lives and are often dependent on loans or gifts from neighbors, friends, and relatives, to make ends meet. Among the poorest in Ikisaya, some did not come to any meetings about IEC because they were not members, or they chose not to speak up in meetings. The poor in Ikisaya are not only economically marginalized, they also have lower levels of education. Many felt that their lack of education made them unable to take an active part in public meetings and discussions. As one woman said: “Decision-makers are only for those people who have education, but I am not educated” (HH#14).

While poor people might exclude themselves from participating, local elites might also use deliberate strategies, such as language, to exclude less powerful and less educated members of the community (Cornwall 2004). I experienced that relatively rich people in the community emphasized the need for proper education, skills, security, and on the need to be suitable to interact with, work for, or to have the facilities to house researchers. A relatively well-off person in

the village said this: “You know there is no politics (at IEC). The people themselves sit down and decide. Some people are qualified for that” (HH#4a).

The poorest people in Ikisaya have less access to networks outside the village, and they are more dependent on fellow villagers for loans, gifts, or help when experiencing stress and during the dry season. Moreover, because of the long distances within Ikisaya, and from Ikisaya to, for example, the nearest health clinic, or hospital, good connections with people with motorbikes or cars can be crucial if someone is bitten by a snake, or during a complicated child birth. As emphasized by Williams et al. (2003), the poorer segment of the population may be scared to say something controversial in a meeting and risk breaking important networks, or relationships, within the village. One informant said this when I asked her why she didn’t bring up her complaints in meetings:

It is not possible to decide in a group, in members, because some people fear to speak out. You know those people are many and they have power. So, we fear how to live with them after we have discussed that thing (HH#5).

On the other hand, the community elected many of the executive board members in their absence, which can mean that the population in Ikisaya generally trusted the rural elite to make good decisions for them. Moreover, as emphasized in Cornwall (2004) and by Williams (2004), the poor may have ways, or channels, outside Ikisaya Energy Group to express their views. In Ikisaya, such a structure might be the village elders’ council. People can go to the village elder of their cluster, who brings issues forward to the village council (HH#23 and P#10).

## 7.7 Prospects for long-term vulnerability reduction in Ikisaya

To conclude this chapter, I will answer sub-question 4: To what extent has ST contributed to reducing contextual vulnerability by creating opportunities for livelihood diversification and enhancing empowerment and social capital across groups in Ikisaya?, and sub-question 3: To what extent has the IEC, through the



selected business model, managed to provide inhabitants of Ikisaya, including the poorest, with access to solar powered electricity services?

### **7.7.1 Vulnerability reduction in Ikisaya**

Coming back to the framework of contextual vulnerability, IEC targets social and economic structures, and political and institutional structures, through providing electricity to people in the village and surrounding areas. By enhancing opportunities to extend opening and productive hours, and to increase income, the provision of electric light improves the opportunities for livelihood diversification for shop owners, making them more robust in coping with stress and changes. However, shop owners are also dependent on farming and livestock activities to survive, as well as being affected by the economic situation of others in the village. Increased opportunities for shop owners will therefore not be sufficient to adapt to climate change in the longer term, given that Ikisaya does not attract activities from outside, which would increase the internal cash flow in the village.

The potential impact of IEC on education, through increased homework hours, may increase adaptive capacity in Ikisaya in the longer term. However, as education is still not completely free in Kenya, economic constraints may hinder pupils in achieving higher education. In addition, the best secondary schools in Kenya are also more expensive (key informant). Good pupils from poor families might, in this way, be restricted from entering a good school, which in turn reduces their opportunities to be eligible for governmental university grants. The existence of IEC created a new sense of identity and pride among the inhabitants of Ikisaya. Self-esteem is an important element of empowerment, and increasing self-esteem may thus lead to vulnerability reduction. Moreover, access to information through the TV and exposure to electricity led to less social exclusion and may increase the ability of people in Ikisaya to follow, understand, and act on the political situation on a national and international level. More

activity in the town and village markets extends spaces for networking and interaction between community members. Increased social capital may enable collective action and innovation, thus leading to opportunities for livelihood diversification and vulnerability reduction.

Informants in Ikisaya highlighted that the provision of good light had resulted in fewer fights, rapes, and robberies. According to them, it was more secure being in Ikisaya market at night, and this resulted in more women spending time at the market after dark. Informants in all three locations told me that there was more activity in town and village markets during the night than before. Thus, the provision of light increased security, which led to the increased mobility of women, and extended spaces for social activities. Better security and extended spaces for interaction may contribute to increasing social capital and trust within the communities in the longer term.

After the first seven months of operation, there are few signs of a catalyzing effect connected to the implementation and operation of IEC. Interestingly enough, the shop owners in Kalwa, where people generally had participated less in the preparatory process, and had less knowledge about IEC than people in Ikisaya, seemed to be more innovative in increasing their incomes with the help of the electric lanterns. However, it might be too early to say whether the participatory process and the establishment of a social enterprise will contribute to business innovation in Ikisaya.

Although IEC brought important changes to Ikisaya, they are not sufficient alone to facilitate long-term adaptation to climate change. To enable people to meet the increased challenges created by climate change and other stressors, further investments are needed in terms of infrastructure, education, communication, networks, and opportunities for formal employment. In addition, as IEC is a limited and small-scale electricity provider, further investments will be needed to meet electricity demand in the long term.

### **7.7.2 Feasibility of the Ikisaya Energy Centre model**

As chapter 6 showed, IEC is not yet able to ensure financial sustainability in Ikisaya, but depends on income from richer places like Malalani and Endau. While many people in Ikisaya, especially shop owners and those with paid jobs, are able to rent the lantern, those among the poorer segment of the population could not access the services. Thus, while IEC struggles to get enough income, the subsidized prices at IEC were not low enough for these families. These findings suggest that the IEC model might not represent a viable model for meeting the needs of everybody in very poor communities like Ikisaya.

However, while the immediate economic effects are largely confined to shop owners and those with a regular income, the poorest population in Ikisaya benefit from IEC through organized evening preps in schools, access to copying and charging services and information, and increased well-being. For those who struggle to get enough food and water for their families, light, whether it is electric, or fuel based, might be unaffordable. While a solution could be to implement a differential pricing structure, with highly subsidized or free lantern rental for poorer households, it would be challenging for a CBO to determine who would be eligible for lower prices (P#8). As IEC is struggling to meet operation and maintenance costs, the IEC model might not be sufficient to provide electricity for poor communities like Ikisaya, even when the initial investment is covered. While business revenue can cover operation cost, further funding for replacing equipment may be needed to ensure a sustainable provision of electricity services in the village.

Compared to mini-grids or solar PV home systems, the IEC model is connected with benefits as well as challenges. Jacobson (2007) found that solar PV home systems were mainly used for watching TV, while in Ikisaya, IEC had a substantial effect on increased opportunities for homework and increased productivity. As in Ikisaya there are long distances between the settlements, and

people have to walk to IEC or the sub-centers, the charging-station model thereby adds yet another task to people's daily schedule. The distance is restricting people living far from IEC from gaining access to services. The national grid is expected to go through Ikisaya. However, most people there will not be able to pay the connection fee. Although the poorest and most distant settlements may not be able to access the services at IEC on a regular basis, the IEC model may nonetheless represent a good alternative for electricity provision in rural areas, so long as the community manages to run IEC in a sustainable manner.

## 8. Concluding chapter

This chapter summarizes my findings and points a way for further research. My fieldwork was conducted shortly after Ikisaya Energy Centre (IEC) opened and these findings can only be seen as early results. The limitations of this study taken into consideration, I here answer my research question, regarding to what extent Solar Transitions (ST) has managed to create a financially, organizationally, and socially sustainable model for basic rural electricity supply, and to what extent the services provided by Ikisaya Energy Centre (IEC) reduce vulnerability across groups within Ikisaya village.

### 8.1 Vulnerability reduction and social change

During the short time IEC had been in operation, it created significant positive changes in Ikisaya in terms of enhanced opportunities for livelihood diversification and education, and increased well-being. Moreover, IEC connected Ikisaya with the outside world through access to TV and news and improved access to information. Thereby, IEC contributed to limit social exclusion of the community. The establishment of IEC, and the services it provided, addressed economic, social, and political structures. IEC therefore contributed to reducing contextual vulnerability in Ikisaya in the short term. The ability for IEC to reduce vulnerability in the longer term depends on the community's ability to run IEC collectively and take leadership in the project, and on ensuring financial sustainability.

The poorest in Ikisaya did not benefit directly from the services at IEC, but benefited indirectly in various ways. While IEC's customer base was largely confined to shop owners, the poorer segments could not afford to use the services on a regular basis. Moreover, long distances from the facilities constrained many inhabitants from accessing the services. However, while the poorest households

in Ikisaya were not able to rent lanterns regularly, they still benefited indirectly through organized homework classes in schools, and the opportunity to use the services when they could afford it. Important for the poorest customers was, for example, the copying machine, because they need copies of their ID cards to access governmental food programs. The IEC model proved more accessible than other projects driven by government or market forces. While only a few families in Ikisaya were able to afford solar home panels, or access to the national grid (when it comes to Ikisaya), many more could afford to rent lanterns at IEC. Compared to Jacobson's (2007) study, the charging-station model also fostered more productive uses of electricity than solar home panels did, and can therefore be seen as a more rewarding option for rural electricity supply in contributing to vulnerability reduction.

The literature on participatory development and social entrepreneurship emphasize the ability of these approaches to enhance social capital and empowerment, and thereby catalyze social change. IEC's presence in Ikisaya led to improved opportunities for education, access to TV, enhanced opportunities for bonding and bridging between people, and empowerment through increased self-esteem and well-being. These processes may in turn lead to social change. Informants told me that the provision of electric light had led to increased activity in the village, and may thus have enhanced opportunities for networking between inhabitants. However, in Ikisaya, it seemed like ties were largely established within relatively closed networks (bonding), with limited cooperation across groups (bridging). Many of my informants expressed little trust in other community members. This lack likely restricts the ability of people to act collectively. The prospect of enhancing collective action within the community will depend on raising the level of trust between inhabitants.

While local entrepreneurs played a role in fostering innovative and collective action in the study presented by Osbahr et al. (2010), findings in this study show

that the establishment of IEC has not yet contributed to increased innovation and entrepreneurial initiatives in Ikisaya. Interestingly, the scope for new innovative activities seemed higher in places far away from the IEC. Thus, at the point of this study, there was no correspondence between being exposed to entrepreneurial activities, and increased innovation within the community.

Nonetheless, the effect of basic electricity service provision in Ikisaya was quite remarkable, especially in terms of opportunities for livelihood diversification, education, and increased well-being. The facilitation of long-term vulnerability reduction and climate change adaptation as a result of IEC however, depends on the ability of the organization to operate sustainably.

## 8.2 Social value sustained?

IEC had not yet achieved financial, organizational, and social sustainability at the time of this study. The passiveness of the board, the lack of a robust organization, and the dominance of one family, challenged the organizational and social sustainability of IEC. As elaborated in the theory chapter, the ability of social entrepreneurs to create and sustain social value depends on their ability to capture economic value. To sustain its services, IEC needs to cover operation and maintenance costs. However, while the need for electricity was high in Ikisaya, the ability of people to pay was too low to sustain the enterprise. One year after the opening of IEC, the business was still not creating sufficient revenue.

The financial sustainability of IEC also depends on the staff's ability to increase revenue, and to run the business in a responsible manner. ST used participatory methods to transfer the leadership of IEC to the community. The transfer of social entrepreneurship proved difficult. At the time of my fieldwork, the staff largely seemed to lack the initiative and engagement needed to run IEC. Staff members did not make any effort to increase revenue and some even stole money from the project, jeopardizing IECs continued existence. The lack of

responsibility among some staff members may be attributed to their expectation that the ST team will reinvest if they should fail to save enough on their own. Thus, instead of being empowered to run their own development project, the staff showed signs of dependency towards the ST team. The risk that participatory projects create dependency, rather than empowerment, is emphasized by scholars such as Mosse (2001) and Olwig (2012). In Ikisaya, the staff's dependency on the ST team can be attributed to the lack of clear communication about when funding and assistance would stop. Moreover, the ST team took the main decisions regarding income and expenditure at IEC. Thus, apart from running the Centre, the staff did not have a lot of decision-making power. This lack of real decision-making power may in part explain staff members' attitudes as service providers, rather than entrepreneurs.

This study illustrates that it is difficult, but not impossible, to transfer the motivation to run a social enterprise. One staff member differed from the others, and can be an example of the transfer of social entrepreneurship. She appeared to have a motivation for the social mission of IEC. Hence, the motivation to devote time and effort for the common good of the community may be transferred if projects succeed in identifying the right community members. However, as finding these individuals may be time-consuming and based on luck, it may not be a scalable solution for vulnerability reduction. A model based on personal economic incentives would be less dependent on community members' intrinsic motivation and a functioning community-based organization. However, a community-based structure ensures priority of social aspects over financial aspects, and can therefore create more social value than individual-based initiatives. Financially focused models will thus be at the cost of accessibility for the poor and limit social value creation.

Participatory methods helped ensure relevance of the services offered at IEC, and laid a foundation for organizational and social sustainability of the project. The



diverse ways in which the ST team interacted with groups and individuals within the community, created a strong sense of ownership across groups in Ikisaya. Moreover, ST's understanding of the local context played an important role in ensuring a check and balance function within the board, restricting the possibility for elite capture. The combination of a strong sense of community ownership and a context-sensitive board can be important factors in ensuring the organizational and social sustainability of IEC. However, this study also shows that the trade-offs involved in participatory projects may severely threaten project sustainability. Trade-offs included a focus on the financial sustainability and the leadership of the staff, at the cost of organizational sustainability in terms of participation by the board and the community. A second trade-off was between ST's will and wish for the project to be sustained, and the creation of local responsibility and leadership of the staff. This undermined the financial sustainability of the Centre. A third trade-off was the convenience in relying on mainly one family, which threatened the social sustainability of the project.

My research shows that the IEC brought several benefits and contributed to vulnerability reduction across groups in Ikisaya. However, the organization had not reached financial, social, and organizational sustainability at the time of this study. If the ST team manages to build on the emerging leadership in Ikisaya and strengthen the organization, the community may be empowered to run IEC. However, to contribute to sustained accessible electricity services and long-term vulnerability reduction in Ikisaya, IEC most of all needs to become financially sustainable. While a more engaged staff and a stronger organization may increase income, the ability of people in Ikisaya to pay for the services may be too low for IEC to achieve full financial sustainability. Further support from ST or other donors, might be needed to replace the batteries when they are worn out. This questions the ability of social enterprises to fully sustain social value, through trade, in very poor communities, such as Ikisaya. However, most inhabitants cannot afford other electricity alternatives, such as solar home panels, or to

connect to the national grid. Thus, although the IEC model was not able to reach all and may not achieve full financial sustainability, the model represents a good alternative for basic electricity provision in rural areas. Further research is needed to determine whether IEC will evolve into a sustainable model for rural electricity supply and contribute to vulnerability reduction in the longer term.

Running a social enterprise requires a set of inner qualities. However, IEC was initiated and designed by an outsider. At the time of my fieldwork the staff, the board, and the community, still saw the IEC as an external development project, which can explain their lack of leadership and responsibility for the project. This illustrates Nustad's (2007) point on development projects, like IEC, being initiated and developed by outsiders, and therefore can never be "bottom-up." Nevertheless, a large number of people in the world today still need access to electricity and other basic services. There are various ways to deliver electricity services, for example, government initiatives, development aid, and market forces. However, bad governance, limited funding opportunities, and the inability for poor people to pay for services, restrict them from accessing services, getting out of poverty, and dealing with the consequences of climate change. Regardless of the various challenges discussed in this study, the ST project has brought significant improvements to Ikisaya that the community could not have obtained on their own. In light of the dire consequences of climate change, the urgency for new alternatives to meet the needs of already vulnerable populations in developing countries is higher than ever. The potential role of social entrepreneurs in providing an alternative to governments, development agencies, and market forces for basic service provision, as well as in contributing to vulnerability reduction, should be further explored.

## 9. Appendices

### 9.1 Overview of interviews

Informant group	Number of informants	Informant code
Professionals: IEC staff and board and ST team	11	P
Households in Ikisaya	25	HH
Shop owners in Malalani and Endau	10	SH
Essays from standard 8 pupils	11	Essay
Key informant: formal interviews with key informants	4	Key informant
Number of informants	61	

Informant group	Informant ID	Interview date
Professionals: IEC staff and board and ST team	P1	11.10.2012
	P2	15.10.2012
	P3	16.10.2012
	P4	20.10.2012
	P5	17.10.2012
	P6	31.10.2012
	P7	03.11.2012
	P8	11.06.2013
		14.10.2013
	P9	08.10.2013
	P10	11.10.2013
	P11	16.10.2013

Informant group	Informant ID	Received
Written essays from standard 8 students at Ikisaya Primary School	Essay 1	22.10.2012
	Essay 2	22.10.2012
	Essay 3	22.10.2012
	Essay 4	22.10.2012
	Essay 5	22.10.2012
	Essay 6	22.10.2012
	Essay 7	22.10.2012
	Essay 8	22.10.2012
	Essay 9	22.10.2012
	Essay 10	22.10.2012
	Essay 11	22.10.2012

Informant group	Informant ID	Interview date
Households in Ikisaya	HH1	22.10.2012
	HH2	26.10.2012
	HH3	27.10.2012
	HH4a	28.10.2012
	HH4b	01.11.2012
	HH5	29.10.2012
	HH6	29.10.2012
	HH7	30.10.2012
	HH8	31.10.2012
	HH9	31.10.2012
	HH10	31.10.2012
	HH11	05.11.2012
	HH12a	22.10.2012
	HH12b	29.10.2012
	HH13a	30.10.2012
	HH13b	30.10.2012
	HH14	31.10.2012
	HH15	01.11.2012
	HH16	03.11.2012
	HH17	05.11.2012
	HH18	05.11.2012
	HH19	05.11.2012
	HH20	06.11.2012
	HH21	06.11.2012
	HH22	23.10.2012
	HH23	23.10.2012
	HH24	05.11.2012
	HH25	06.11.2012
Shop owners in Malalani and Endau	SH1	18.10.2012
	SH2	18.10.2012
	SH3	19.10.2012
	SH4	19.10.2012
	SH5	19.10.2012
	SH6	24.10.2012
	SH7	24.10.2012
	SH8	24.10.2012
	SH9	13.10.2012
	SH10	24.10.2012
Key informants: formal interviews with key informants	Key informant	09.11.2012
	Key informant	30.10.2012
	Key informant	29.10.2012
	Key informant	17.10.2012

## 9.2 Interview guides

### *Set questions for Solar Transitions team members*

1. In your opinion, what is the most important goal of Solar Transitions?
2. What have been the biggest obstacles or challenges for the implementation of the project?
3. What do you see as the biggest challenges for the project today?
4. What do you think is the most important knowledge from Solar Transitions for future projects?
5. Would you have liked to do something differently?

### *Interview guide Ikisaya Energy Centre staff and board*

#### **Personal data**

1. Name
2. Age
3. Gender
4. Level of education
5. Position in connection with the Ikisaya Energy Centre
6. Clan

#### **About the Centre**

7. What services are people in Ikisaya demanding the most?
8. What are people using the lanterns for?
9. What are people using the mobile phones for?
10. What are people using the IT services for?
11. What do people want to watch on the TV?

#### **Local ownership and participation: Ownership of staff/board**

12. What are the main issues of the Ikisaya Energy Centre?
13. What is working well at the Ikisaya Energy Centre?
14. What do you wish the Centre could offer? What would make the Centre better?
15. What are the restricting factors that prevent people from using the services?
16. How can these challenges be fixed?
17. Do the staff/board/you have the power to change the way things work at the Energy Centre according to what you think is better for the Centre?
18. Examples: staff, renting laws, prices, opening hours.
19. Have you changed anything at the Centre since it opened in March?
20. Please tell me the story/process of how that happened.
21. Who initiated it?
22. Where was it initiated?
23. How did the rest of the staff react?
24. When did you decide to make the change?
25. When was the change implemented?

26. If you could change anything at the Energy Centre today, what would it be?
27. Are you going to do that?
28. Why/why not?
29. How do you feel about running the Centre on your own when the Solar Transitions project is ending?
30. Do you feel comfortable to run the Centre on your own without x (the initiator)?
31. What are your thoughts about the future of the Centre?
32. What are your dreams for the Centre
33. What are your dreams for Ikisaya village?
34. Can you describe how you see life in Ikisaya in 10 years?

### **Individual capacity building of staff and possible spill over effects for the rest of the community**

35. Do you feel that you have learned something when working with the Ikisaya Energy Centre that you can teach to others in Ikisaya and that could be helpful for them?
36. Examples?
37. Have you done this already?
38. Income generating activities and economic development in Ikisaya
39. Are some people using the services at the Centre to make some money, or to increase the income of their families?
  - a. Light
  - b. Mobile phones
  - c. IT services
40. What individual initiatives have sprung out of the Centre so far?
41. Who and where?
42. Do you think that the Centre is contributing to the development of Ikisaya?
43. How?

### **Involvement of local population**

44. What do you think about the involvement of the people of Ikisaya in establishing the Energy Centre?
45. How do you feel that people in Ikisaya has been involved in the process?
  - a. Examples?
46. Do you feel that they understand the Energy Centre and how things work there?
47. Do people generally express their opinions about the Centre, how it is run, what services it provides?
48. When was the last time someone expressed their opinions to you?
49. Please tell me what happened.

### *Interview guide households in Ikisaya*

#### **Personal data**

1. Name
2. Age
3. Gender

4. Marital Status
5. Children/grandchildren in household
  - a. Age
6. Household members
7. Gender of head of household
8. Level of education
9. Clan
10. Are you member of any community groups?
  - a. Which ones?
  - b. Can you mention some other members of the group?

**Economic indicators, perception of a better life and agency to change your life**

11. What are the main sources of income for your household?
  - a. About how much money do you get each month/week?
  - b. What are your main expenses?
  - c. Are you saving money? For what?
12. What kind of material is your house made of? (Bricks, cement, mud, poles.)
13. Do you keep goats? If yes, how many?
14. Do you keep cows? If yes, how many?
15. Do you keep chickens? If yes, how many?
16. Do you keep donkeys? If yes, how many?
17. Do you have a shamba (field)?
  - a. If yes:
    - i. What do you grow there? (Millet, green grams, maize, cow peas.)
    - ii. Do you produce for your own use or do you sell the surplus?
    - iii. How was the harvest last season? Do you have anything left from your last harvest?
    - iv. How do you cope with the situation when the harvest is too little?
      1. When was last time you did not have money?
      2. What did you do then?
    - v. Do you have any other sources of income?
    - vi. What do you do when you have no money? How do you get food?
18. What could you do in your shamba to prepare it for a season with little rain?
  - a. Are you doing that? If no: Why not?
  - b. Where did you get the idea of doing that from?
  - c. Do you know of anything that someone you know does to prepare the shamba for a season with little rain?
19. How do you get your water? (Distance, time, transportation.)
20. How much water do you consume daily?
21. How many meals do you eat a day?
22. How many times a week do you eat meat?
23. Do your children go to school?
24. What are your main worries in your life? What makes you scared?
25. What would make your life better? What would make you happier?

26. How can you achieve that?

### **Individual relationship with Ikisaya Energy Centre**

27. Are you a member of Ikisaya Energy Centre?

a. If yes

- i. When did you become a member?
- ii. Why did you become a member?
- iii. What do you think are your benefits as a member?
- iv. What do you think are your duties as a member?
- v. What services are you using? (Renting lamps, charging mobile phone, printing/typing, watching TV.).
- vi. What do you use the services for (Lantern, mobile phone, printing/typing, programmes on TV.).
- vii. Why are you/are you not renting the lantern?
  1. If renting: What are you using it for?
    - a. How did you get light before the lantern came? How much did you spend on kerosene and batteries?
    - b. Why do you prefer the lantern?
  2. Can you please explain to me how a normal day is for you, from the time you wake up in the morning until you go to bed in the evening?
    - a. Did the lantern change the way you spend your day?
  3. If not renting: Do you have anything you would have liked to use the lantern for?
- viii. About how much money do you spend on services at the Energy Centre every week?
- ix. What do you think about the services offered by the Energy Centre?
- x. What do you think about the prices at the Energy Centre?
- xi. What would services would you have liked to have at the Energy Centre which are not there today?

b. If no:

- i. Why are you not a member?
- ii. Would you like to become a member?
- iii. What would you do if you were a member of the Energy Centre?

### **Local ownership and participation**

28. How did you get to hear about the Energy Centre the first time?

29. When did you get to hear about the Energy Centre?

30. What did you think when you heard that Ikisaya was getting the Energy Centre?

31. What did you think the Energy Centre would do for you?

32. Have you ever been to meetings regarding the Energy Centre?

a. If yes:

- i. When was the last meeting you went to?
- ii. What was the meeting about?
- iii. How did you get to hear about the meeting?
- iv. Who was at the meeting?



- v. Did you speak or ask any questions at the meeting?
  - 1. If yes:
    - a. Can you recall what the question was about?
    - b. Did you feel that you got a good response to your question?
  - 2. If no:
    - a. Did you want to say anything?
- b. If no:
  - i. Why have you not been to a meeting?
  - ii. Would you have liked to come to a meeting?
- 33. Who do you see as the owner of the Energy Centre?
- 34. Who do you think are making the decisions at the Energy Centre?
- 35. Do you feel that you can be part of making the decisions at the Energy Centre? How?
- 36. Do you feel that your opinion was taken into account before the Ikisaya Energy Centre was built?
- 37. Who do you see as the boss of the Energy Centre?
- 38. Who do you think has the top authority of the Energy Centre?
- 39. Is there anyone in particular in Ikisaya who has the power to change anything at the Energy Centre?

### **Changes as a result of Ikisaya Energy Centre**

- 40. How was it in Ikisaya before the Energy Centre opened in March?
- 41. Do you think Ikisaya Energy Centre has brought any changes to Ikisaya?
  - a. If yes:
    - i. Positive effects? Negative effects?
- 42. Has the Energy Centre done anything for the development of Ikisaya, has the Energy Centre made Ikisaya a better place to live?
  - a. If yes, in what ways?
- 43. Do you think that the Ikisaya Energy Centre changed the opportunities for what people in Ikisaya can do?
- 44. How do you think Ikisaya will be like in 10 years? Will it be a good place to live?
- 45. Do you think that some people in Ikisaya are not able to use the Centre?
- 46. Do you think that some people in Ikisaya are using the Centre more than others?

### **Personal life and changing opportunities**

- 47. Has the Energy Centre made your personal life any better?
  - a. If yes, in what ways?
- 48. Is the Energy Centre making your economic situation better?
- 49. Where do you see yourself in the next 10 years?
- 50. What do you wish for your children when they grow up?
- 51. Has the Energy Centre increased the opportunities for your children to have a good life?
- 52. Do you see your children living in Ikisaya when they grow up?
- 53. If female, do you think the Centre made the situation for women better in Ikisaya? How?

### **Business development, income diversification in Ikisaya as result of the Centre**

54. Do you know anybody who has taken advantage of the light and made more money because of the light? Have any businesses, small shops etc. started up in Ikisaya during the past 6 months? If yes: Who and what kind of businesses?
55. Do you know of anyone planning to make a business? Who and what kind of business?
56. Do you see any business opportunities for yourself?

### *Interview guide shop owners in Endau and Malalani*

#### **Set questions**

1. Name
2. Age
3. Marital status
4. Children
5. Household members
6. Level of education

#### **Economic indicators**

7. What are the main sources of income for your household?
8. What material is your house made of?
9. Do you have: goats, cows, chicken, donkeys, and how many?
10. What do you grow in your field (shamba)?
11. How many meals do you eat per day?
12. Are your children in school?

#### **Well-being**

13. What are your worries?
14. What make you scared?
15. What makes you happy?

#### **Lantern use**

16. When did you start using lanterns?
17. What do you use them for?
18. How much do you spend a month on lanterns?
19. Did having the lantern change your business in any way? (Income, opening hours, preparation during the evening.)
20. What do you do with the extra money?
21. Do you have any thoughts about how you are going to develop your business?

#### **Effects on personal life and dreams**

22. Does having the lantern make your personal life better?
23. Do you think you have more opportunities in life now?
24. How do you see yourself in 10 years?
25. Do you have any wishes for your children when they grow up?
26. What are your personal dreams?

#### **Effects on Malalani/Endau**

27. Do you think that the lanterns brought any changes to Malalani/Endau?
28. Do you think that the lanterns brought any changes for women/children/night life?

### 9.3 List of observed activities

Activity	Details	Ref. code
Evening class at Ikisaya Primary School	20-30 pupils	None
Study group Malalani Secondary School	10 pupils	None
Private evening teaching in Ikisaya	3 students and 1 teacher	None
Home visits in lantern renting households in Ikisaya	1 household in Ngovovoni and 1 household in Ngiluni	None
Meeting ST team and IEC staff		Meeting 30.10.2012
Meeting ST team and IEC staff		Meeting 01.11.2012
Meeting ST team and IEC board		Meeting 02.11.2012
Meeting ST team and local leadership		Meeting 02.11.2012
Book keeping and statistics collection at IEC	Gathering data in cooperation with IEC staff: members lists, member details, lantern rental receipts, and account books	Data collection at IEC

### 9.4 List of documents analyzed

Category	Document name	Date	Source
Background research before Ikisaya was chosen for pilot project	Solar Transitions Funding Proposal	2008	ST team
	The solar transitions research on solar mini-grids in India: Learning from local cases of innovative socio-technical systems (unpublished version)	2011	ST team
Preparatory research in Ikisaya and participatory activities in the planning process.	Report from the Solar Transitions field visit 15–19. October 2010 in Ikisaya, Kenya	October 2010	ST team
	Report from the Solar Transitions meetings and field work 17 <sup>th</sup> to 23 <sup>rd</sup> of March 2011, Ikisaya, Kenya	March 2011	ST team
	My village: summary of responses from children in Ikisaya, STD 8, Ikisaya Primary School	March 2011	ST team
	Field notes, Ikisaya, Kenya	April 2011	ST team

	17 <sup>th</sup> –23 <sup>rd</sup> of March 2011		
	Letter from ST team to assistant chief – Regarding the information requested by you for the planning of the solar project. 8 <sup>th</sup> April 2011	April 2011	ST team
	Preliminary Advice on the Organization of the power supply in Ikisaya	April 2011	ST team
	Report from field work and meetings in Ikisaya on 22–27 of May 2011	May 2011	ST team
	Letter from ST team to assistant chief: Report from the meetings and field work in Ikisaya in March. 20 May 2011	May 2011	ST team
	Letter from ST team to assistant chief: Feedback on the draft by-laws. 31 May 2011	May 2011	ST team
	Letter from ST team to assistant chief: The suggested technical design and electricity services in Ikisaya solar project. July 1 <sup>st</sup> 2011	July 2011	ST team
	Ikisaya Energy model for village scale solar power supply	August 2011	ST team
	Minutes from the visit in Ikisaya November 16–21. 2011	November 2011	ST team
	Minutes from the visit in Ikisaya November 16–19. 2011	November 2011	ST team
	Solar Transitions Project: Ikisaya Survey Final Report	December 2011	ST team
	Field notes, Ikisaya, Kenya, February 2012	February 2012	ST team
	Field report, Ikisaya, Kenya 3 <sup>rd</sup> to 12 <sup>th</sup> February 2012	February 2012	ST team
The Ikisaya Energy Centre model and legal documents	Constitution of Ikisaya Energy Group: A community based organization	2011	ST team
	Job announcements: manager, IT clerk, part time accountant, charging attendant, evening attendant	2011	ST team
	Project management agreement between Ikisaya Energy Group and Solar Transitions	2011	ST team

	Supply and installation of solar power systems in Ikisaya village, Kitui county, Muitu district. Contract to supply and install. 18.01.2012	January 2012	ST team
	Ikisaya Energy model for village scale solar power supply	June 2012	ST team
Follow-up visits and operation of Ikisaya Energy Centre March 2012–June 2013	Report: The start-up and first weeks of operation at Ikisaya Energy Centre, May 6 <sup>th</sup> 2012	May 2012	ST team
	Accounts Ikisaya Energy Centre March 2012–September 2012	October 2012	IEC staff and Lan Marie Nguyen Berg
	Accounts Ikisaya Energy Centre October 2012–June 2013	December 2012–July 2013	IEC staff and ST team
	Ikisaya meetings and results, October to December 2012: internal report to the Solar Transitions team	December 2012	ST team
Other documents	Solar xChange research proposal	n/a	ST team
	The Energy Centre Model–An Approach to Village Scale Solar Power Supply: The Solar Transitions pilot project in Kenya, draft project report 25.05.2013	May 2013	ST team
	Map of Ikisaya with GPS coordinates for households	2011	ST team
	Precipitation and temperature data from Makindu meteorological station	November 2012	Kenya Meteorological Department



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